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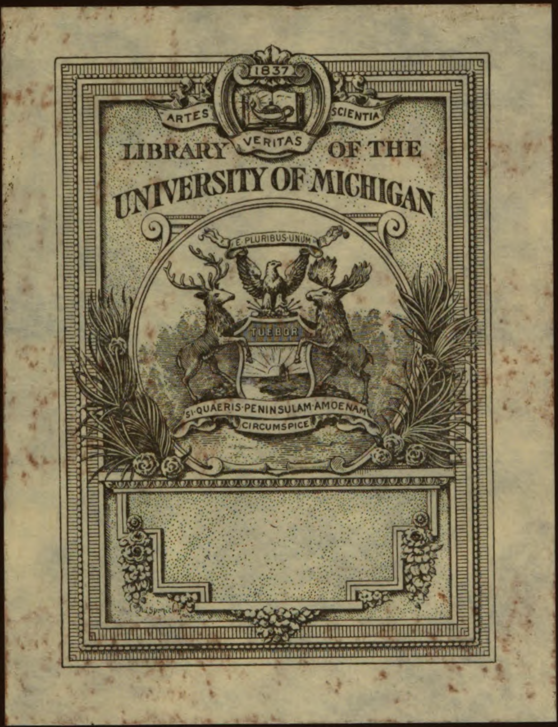
OF THE
HEALTH DEPARTMENT

OF THE

CITY OF BOSTON

1906



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THIRTY-FIFTH ANNUAL REPORT

OF THE

HEALTH DEPARTMENT

OF THE

CITY OF BOSTON

FOR THE YEAR 1906

BOSTON
MUNICIPAL PRINTING OFFICE
1907

ORGANIZATION OF THE HEALTH DEPARTMENT.

SAMUEL H. DURGIN, M.D., *Chairman.*

WILLIAM H. HAYES.

MICHAEL W. NORRIS.

CHARLES E. DAVIS, Jr., *Secretary.*

224124

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BOSTON, February 1, 1907.

HON. JOHN F. FITZGERALD,

Mayor of the City of Boston:

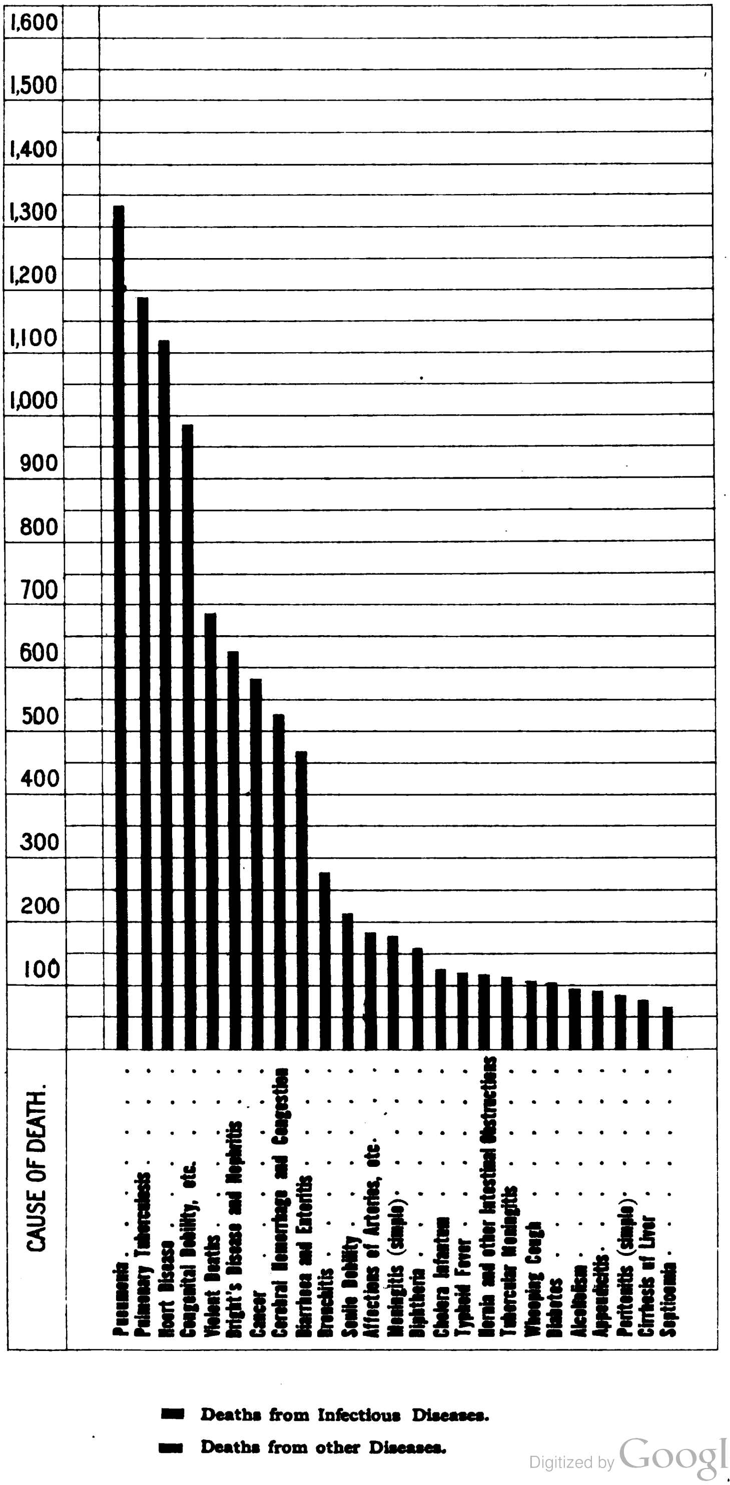
SIR, — The Board of Health respectfully presents the thirty-fifth annual report of the department, covering its operations for the financial year ending January 31, 1907, and the mortality statistics for the calendar year ending December 31, 1906. The general health of the city for the past year, so far as it may be judged by the total mortality and its classified causes, compares favorably with preceding years.

The total number of deaths for the year was 11,411, an increase over the previous year of 404 deaths. The estimated population, in the middle of the year, is 602,526. The death-rate for the year, as calculated on this population, is 18.94 per 1,000 inhabitants. This rate was greater by 0.92 than that of the previous year, but lower by 0.45 than the average of the previous ten years. There were 2,119 deaths from infectious diseases, including consumption, a decrease of 42 deaths. There were 20 more deaths from diphtheria and croup than in 1905, and a proportionate increase in the number of cases. The percentage of deaths to the number of cases of diphtheria reported was 7.00, as against 8.52 per cent. the preceding year. There were 39 deaths from scarlatina, 5 less deaths than in the preceding year, and 60 deaths less than the average for the ten previous years. Typhoid fever caused 122 deaths during the year, 5 more deaths than the preceding year. Fifty-eight of the deaths from this cause occurred during the months of August, September and October, and 73 of the whole number died between the ages of twenty and forty years.

There were 61 deaths from measles during the year. The number of deaths of children under five years of age was 3,439, compared with 3,024 for the previous year, showing an increase of 415 deaths. The respiratory diseases caused 24 per cent. of the mortality for the past year.

CHART NO. 1.

Comparative View of Twenty-five of the Principal Causes of Death during the Year 1906.



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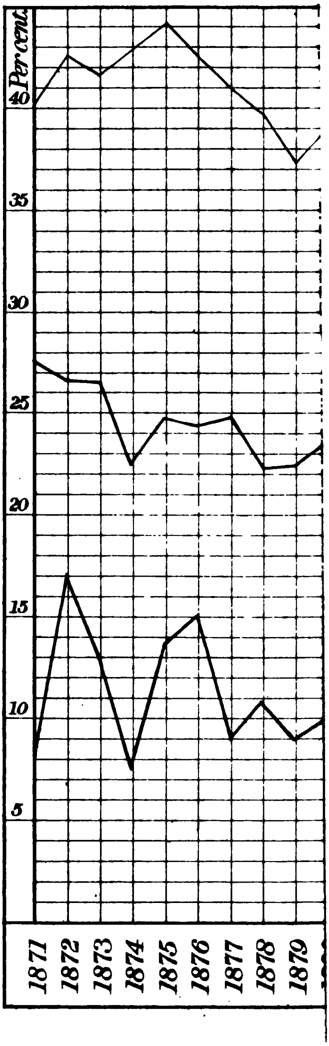

Percentage

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OR FIFTY-SIX YEARS.

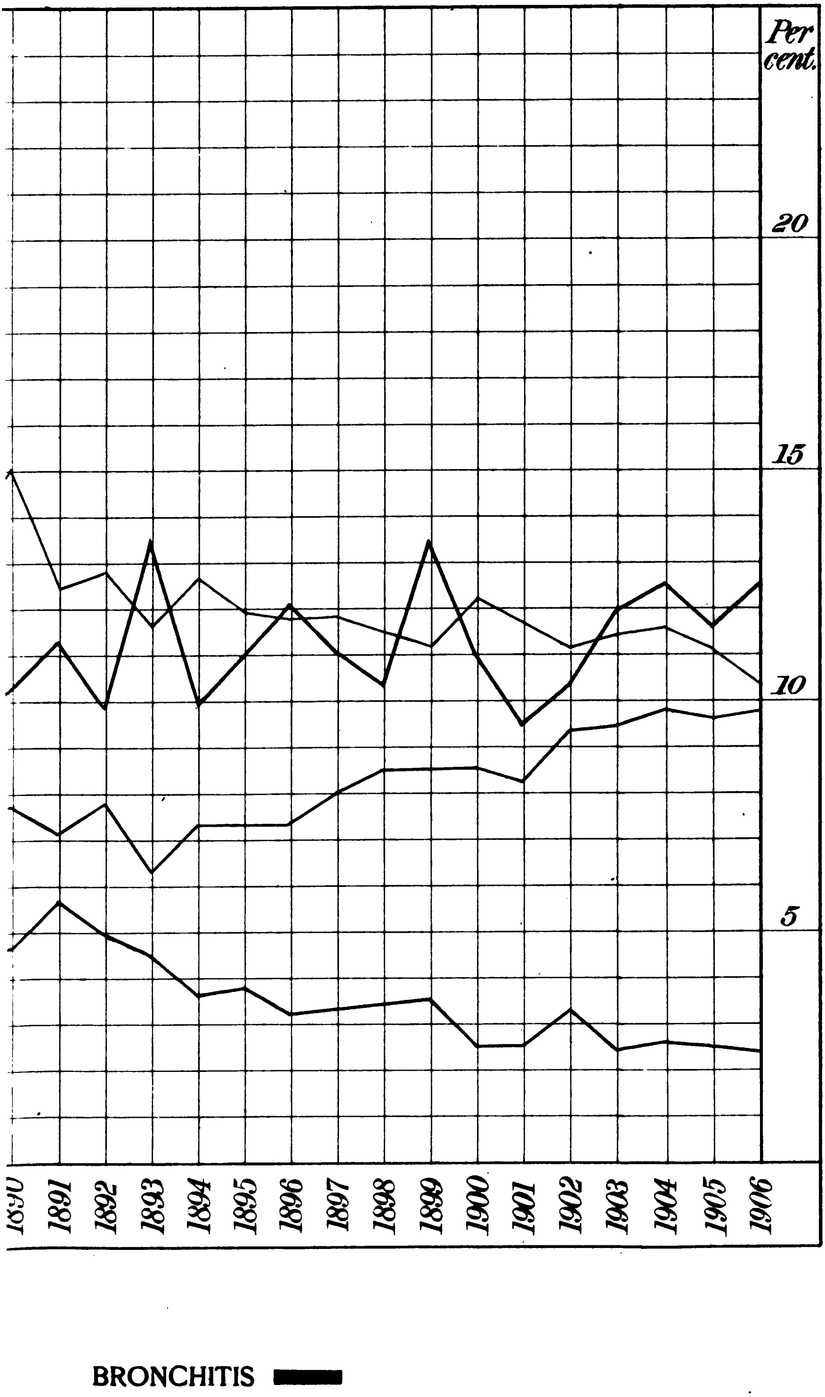
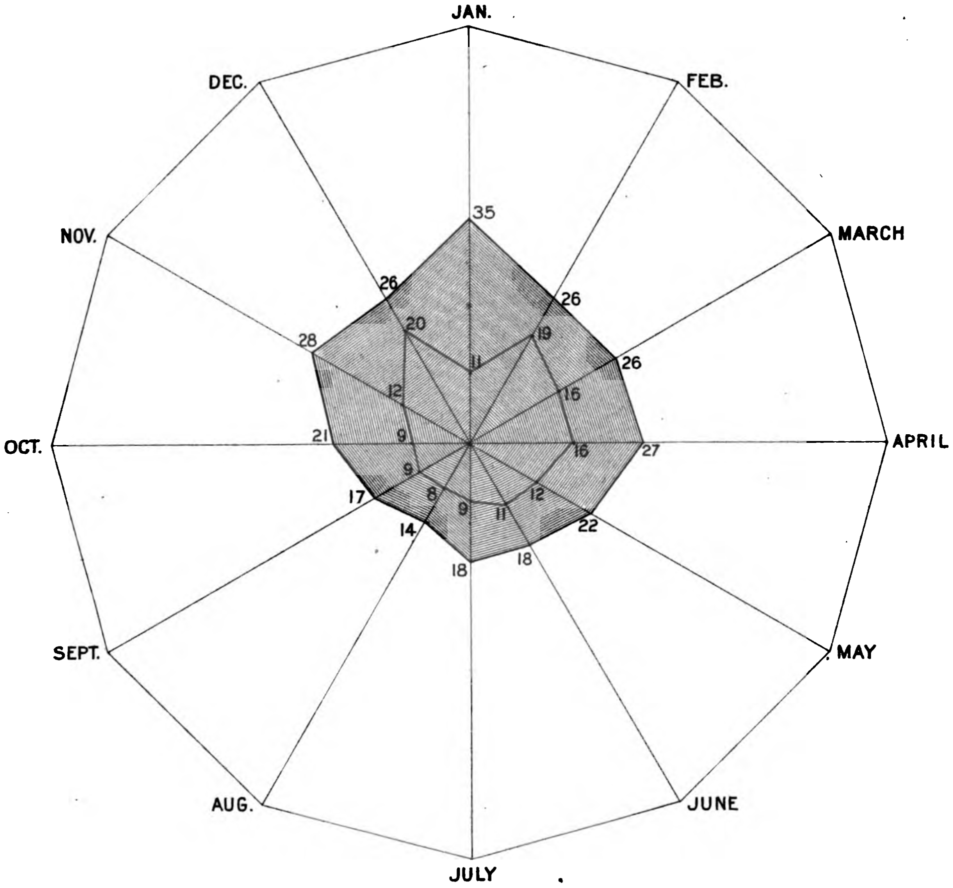


CHART NO. 4.

DIPHTHERIA.



——— **Average deaths per month for ten years, 1897-1906.**

——— **Deaths per month for the year 1906.**

Table I. — Total of Deaths, Still-births and Deaths from Infectious Diseases for Thirty-six Years.

YEARS.	Total Deaths, Exclusive of Still-births.	Still-births.	Rates of Still-births per 1,000 Inhabitants.	Diphtheria and Croup.	Scarlet Fever.	Typhoid Fever.	Cerebro-spinal Meningitis.	Whooping Cough.	Measles.	Smallpox.	Cholera Infantum.	Pyæmia and Septicæmia.	Erysipelas.	Intermittent Fever.	Dysentery.
1871..........	5,888	543	1.88	128	111	176	3	30	9	23	526	....	59	....	56
1872..........	8,090	560	1.91	94	258	229	60	52	60	738	742	....	99	....	56
1873..........	7,869	515	1.76	119	474	243	216	33	16	302	616	....	92	1	57
1874..........	7,812	642	2.19	121	269	202	35	108	41	2	679	26	51	3	56
1875..........	9,060	541	1.28	631	534	227	41	41	65	1	684	22	69	....	97
1876..........	8,253	485	1.41	720	458	145	13	59	2	2	542	36	45	....	96
1877..........	7,316	471	1.37	471	104	156	24	88	2	4	563	18	30	4	166
1878..........	7,636	441	1.28	569	68	120	19	88	145	....	395	14	43	2	216
1879..........	7,398	453	1.24	545	149	119	15	112	2	....	383	29	46	4	101
1880..........	8,531	443	1.22	774	33	154	8	94	49	1	518	18	24	....	121
1881..........	9,016	513	1.29	802	35	207	16	77	108	6	444	23	42	3	96
1882..........	8,995	518	1.26	575	75	212	24	92	25	8	506	33	40	2	83
1883..........	9,740	504	1.17	608	211	198	23	31	152	1	543	42	42	1	88
1884..........	9,622	503	1.17	487	209	216	26	181	13	1	517	40	47	1	61
1885..........	9,618	520	1.30	450	156	152	19	26	84	2	461	32	40	3	62
1886..........	9,268	543	1.35	423	81	135	14	37	36	....	444	43	39	....	61
1887..........	10,073	534	1.33	410	195	183	16	82	119	....	492	37	34	....	59
1888..........	10,179	552	1.33	589	65	170	19	74	27	2	440	27	41	1	48
1889..........	10,259	598	1.42	683	23	186	21	96	48	2	450	26	24	....	76
1890..........	10,181	627	1.39	462	42	155	17	39	19	....	498	31	36	....	80
1891..........	10,571	614	1.33	285	64	154	21	39	21	....	597	44	39	2	48
1892..........	11,286	633	1.34	481	262	137	12	45	19	....	563	37	37	....	30
1893..........	11,710	605	1.24	546	248	148	15	40	27	....	499	56	56	6	39
1894..........	11,520	700	1.39	878	192	141	18	111	8	22	569	53	32	4	38
1895..........	11,329	607	1.21	654	114	163	15	47	19	....	500	67	34	5	43
1896..........	11,634	648	1.25	572	12	162	21	67	27	....	575	61	30	5	44
1897..........	11,154	614	1.16	456	136	173	185	39	21	....	400	73	34	1	18
1898..........	10,886	613	1.13	185	33	185	97	68	27	....	441	69	30	1	41
1899..........	11,167	539	.97	304	74	165	88	76	33	5	280	73	42	1	31
1900..........	11,678	573	1.02	537	181	143	66	99	89	....	299	100	53	6	26
1901..........	11,300	576	1.01	353	210	142	54	65	103	74	210	98	51	1	28
1902..........	10,983	623	1.08	225	87	139	62	132	66	190	186	89	65	8	36
1903..........	10,632	633	1.09	214	65	119	47	108	50	13	180	66	34	....	22
1904..........	10,757	663	1.13	206	39	135	37	29	89	....	206	77	62	2	20
1905..........	11,007	670	1.13	132	44	117	142	29	54	1	182	61	47	2	15
1906..........	11,411	658	1.09	152	39	122	83	112	61	....	124	73	44	1	26

1907 [illegible]

Table II.—Total number of Deaths under One Year; under Five Years, Five Years and Over, with Percentages to the Total Mortality for Thirty-six Years. Also Death Rates under One Year per Ten Thousand Inhabitants.

YEARS.	Total Deaths.	Five Years and over.	Under Five Years.	Under One Year.	PERCENTAGES.			Death Rate under One Year per 10,000 Inhabitants.
					Five Years and under.	Under Five Years.	Under One Year.	
1871..........	5,888	3,493	2,395	1,597	59.33	40.67	27.12	61.89
1872..........	8,090	4,676	3,414	2,157	57.79	42.21	26.66	81.16
1873..........	7,869	4,580	3,289	2,066	58.20	41.80	26.25	64.32
1874..........	7,812	4,454	3,358	2,202	57.01	42.99	22.19	66.45
1875..........	9,060	5,088	3,972	2,263	56.16	43.84	24.98	66.18
1876..	8,253	4,722	3,531	2,036	57.22	42.78	24.67	58.84
1877.........	7,316	4,334	2,982	1,817	59.24	40.76	24.84	51.60
1878..........	7,636	4,630	3,006	1,747	60.63	30.87	22.88	49.30
1879	7,398	4,593	2,805	1,690	62.08	37.92	22.84	47.13
1880..........	8,531	5,182	3,349	2,014	60.74	39.26	23.60	55.50
1881..........	9,016	5,702	3,314	2,005	63.24	36.76	22.24	54.46
1882..........	8,995	5,844	3,151	1,945	64.97	35.03	21.62	52.05
1883..........	9,740	6,113	3,672	2,183	62.76	37.24	22.41	57.58
1884..........	9,622	6,052	3,570	2,235	62.90	37.10	23.23	58.09
1885..........	9,618	6,152	3,466	2,156	63.97	36.03	22.42	55.23
1886..........	9,268	6,082	3,186	2,110	55.63	34.37	22.77	52.57
1887..........	10,073	6,411	3,662	2,312	63.55	36.35	22.95	56.02
1888..........	10,197	6,598	3,599	2,281	64.71	35.29	22.37	53.76
1889..........	10,259	6,626	3,633	2,360	64.59	35.41	23.00	54.10
1890..........	10,181	6,832	3,349	2,271	67.11	32.89	22.30	51.08
1891..........	10,571	6,963	3,608	2,552	65.87	34.13	24.14	55.75
1892..........	11,236	7,501	3,735	2,466	66.76	33.24	21.95	52.78
1893..........	11,710	7,723	3,987	2,531	65.96	34.04	21.61	53.07
1894..........	11,520	7,412	4,108	2,552	64.34	35.66	22.15	52.42
1695..........	11,329	7,394	3,935	2,580	65.27	34.73	22.77	51.45
1896..........	11,634	7,579	4,055	2,670	65.15	34.85	22.95	51.71
1897..........	11,154	7,446	3,708	2,462	66.76	33.24	22.07	46.55
1898..........	10,886	7,309	3,577	2,572	67.14	32.86	23.63	47.47
1899..........	11,167	7,576	3,591	2,404	67.84	32.16	21.53	43.41
1900..........	11,678	7,926	3,752	2,410	67.87	32.13	20.64	42.96
1901..........	11,300	7,831	3,469	2,287	69.30	30.70	20.24	40.29
1902..........	10,983	7,616	3,367	2,257	69.34	30.66	20.55	39.29
1903..........	10,632	7,553	3,079	2,173	71.04	28.96	20.44	37.38
1904..........	10,757	7,652	3,105	2,207	71.13	28.87	20.52	37.51
1905..........	11,007	7,983	3,024	2,186	72.53	27.47	19.86	36.72
1906..........	11,411	7,972	3,439	2,468	69.86	30.14	21.63	40.96

[illegible]

Table III. — Deaths during the Year 1906, by Sex, Condition, Color, Nativity, Parentage and Season.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Total number of deaths	982	944	1,067	1,005	993	799	890	1,014	930	906	869	1,012	11,411
Sex:													
Males	500	490	538	535	519	420	481	538	509	457	458	520	5,965
Females	482	454	529	470	474	379	409	475	421	449	411	492	5,446
Condition:													
Single	467	468	504	514	501	388	508	601	522	450	405	435	5,763
Married	316	294	327	317	284	267	230	254	235	267	275	343	3,409
Widows	128	102	151	108	118	88	92	102	94	118	112	151	1,364
Widowers	52	59	53	51	60	39	50	40	57	52	62	62	637
Divorced	4	4	4	4	3	2	1	2	4	4	4	6	42
Unknown	15	17	28	11	27	15	9	15	18	15	11	15	196
Color:													
White	963	910	1,036	966	963	775	855	983	908	888	849	989	11,085
Black (Negro or Mixed)	19	32	29	37	30	22	35	30	20	17	20	23	314
Indian	....	....	....	....	....	....	....	....	....	....	....	....	....
Chinese	....	2	2	2	....	2	....	1	2	1	....	....	12
Japanese	....	....	....	....	....	....	....	....	....	....	....	....	....
Nativity:													
United States	627	591	666	624	642	485	598	709	620	580	531	614	7,287
Ireland	185	163	171	167	138	147	130	153	147	152	162	193	1,908
England	16	15	28	27	26	22	17	14	14	19	21	25	244
Scotland	10	5	6	8	7	4	5	11	8	8	8	7	87
Germany	13	17	19	14	16	13	13	18	18	14	23	20	198
British Provinces	59	76	92	78	69	53	68	45	46	57	63	71	777
Italy	8	16	23	29	15	23	11	19	14	16	11	24	209
Russia	16	21	20	21	21	16	14	11	12	18	13	13	196
Sweden	11	7	4	6	11	3	3	1	7	8	9	7	77
Other countries	17	19	15	12	15	15	13	17	15	18	13	15	184
Unknown	20	14	23	19	33	18	18	16	29	16	15	23	244
Parentage:													
American	213	198	236	216	242	179	197	220	234	213	185	219	2,552
Irish	323	282	311	308	270	238	253	264	268	260	282	316	3,375
English	17	10	21	23	25	25	16	20	9	21	15	22	224
Scotch	15	8	10	10	9	6	11	14	8	12	15	7	125
German	22	22	24	17	27	12	17	24	21	21	25	28	260
British Provinces	50	68	65	70	67	52	62	67	47	39	52	40	679
Italian	47	49	78	65	48	48	41	49	54	35	35	65	614
Russian	30	37	42	43	37	34	38	39	36	40	29	29	434
Swedish	13	11	6	6	15	4	5	5	10	8	7	7	97
Other countries	65	52	32	24	15	23	39	70	56	57	59	54	546
Mixed	67	77	123	105	125	77	100	109	70	68	63	87	1,071
One parent unknown	45	47	38	52	37	40	45	62	50	59	31	41	547
Unknown	75	83	81	66	76	61	66	71	67	73	71	97	887

Influenza 93

Cholera Morbus 4 +3

Table IV.—Monthly Deaths Reduced to a Standard of 100.

MONTHS. 1906.	Total Deaths in Month.	Monthly Deaths Reduced to a Standard of 100.	Deaths per Day.
January	982	101.3	31.7
February	944	107.8	33.7
March	1,067	110.1	34.4
April	1,005	107.1	33.5
May	993	102.5	32.0
June	799	85.1	26.6
July	890	91.8	28.7
August	1,014	104.6	32.7
September	930	99.2	31.0
October	906	93.5	29.2
November	869	92.7	29.0
December	1,012	104.4	32.6
Total	11,411	100.0	31.3

Table V.—Deaths from Principal Infectious Diseases.

	Total Deaths from each Cause.	Percentage of each Cause to Total Mortality.	Deaths per 1,000 Inhabitants.	Total Deaths per Sex. M.	Total Deaths per Sex. F.	Total Deaths per Sex under Five Years. M.	Total Deaths per Sex under Five Years. F.	Total Deaths under Five Years.	Percentage of each Cause under Five Years to Total Mortality.	
Smallpox	......	......	......	......	......	......	......	......	......	26
Measles	61	.535	.101	36	25	36	23	59	.517	32
Scarlatina	39	.342	.065	23	16	15	12	27	.237	88
Diphtheria and Croup	152	1.332	.252	78	74	56	45	101	.885	41
Whooping-cough	112	.981	.186	49	63	48	61	109	.955	
Typhoid Fever	122	1.069	.202	86	36	2	......	2	.017	2
Erysipelas	44	.386	.073	22	22	7	9	16	.140	
Puerperal Septicæmia	19	.166	.032	......	19	......	......	......	......	
Dysentery	26 26	.228	.043	11	15	4	......	4	.035	
Cholera Morbus	6	.053	.010	3	3	1	......	1	.009	
Phthisis Laryngeal, Pulmonary and General Tuberculosis	1138 1,185	10.385	1.967	635	550	23	29	[illegible] 52	.456	
Influenza	40	.350	.066	14	26	3	1	4	.035	5
Syphilis, Congenital	28	.245	.046	16	12	16	12	28	.245	
Syphilis, Tertiary	17	.149	.028	8	9	......	......	......	......	
Pyemia and Septicæmia	73	.640	.121	37	36	8	8	16	.140	

Table VI.—Yearly Percentages of Principal Infectious Diseases from 1879 to 1906, inclusive, to Total Mortality.

	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892
Smallpox	....	.011	.066	.088	.010	.010	.020	....	....	.019	.019	....	....	....
Measles	.027	.574	1.197	.277	1.560	.135	.873	.388	1.181	.264	.468	.186	.198	.169
Scarlatina	2.014	.386	.388	.833	2.166	2.172	1.621	.873	1.935	.637	.224	.412	.605	2.331
Diphtheria	5.285	6.892	6.665	5.091	4.568	3.585	3.472	3.519	3.137	4.609	5.498	3.938	2.194	3.684
Croup	2.081	2.180	2.229	1.300	1.673	1.475	1.299	1.014	.933	1.167	1.160	.599	.501	.596
Whooping-cough	1.513	1.101	.854	1.022	.318	1.881	.270	.399	.814	.725	.936	.383	.368	.400
Typhoid fever	1.608	1.804	2.295	2.356	2.032	2.245	1.580	1.456	1.816	1.667	1.813	1.522	1.456	1.219
Erysipelas	.527	.281	.465	.444	.431	.448	.415	.420	.337	.402	.234	.358	3.68	.329
Puerperal fever	.851	.726	.754	.833	.728	.467	.207	.183	.228	.176	.117	.265	.170	.249
Dysentery	1.365	1.488	1.064	.922	.903	.663	.644	.658	.585	.470	.741	.294	.454	.266
Cholera morbus	.351	.445	.177	.511	.246	.509	.319	.302	.258	.264	.214	.225	.189	.204
Cholera infantum	5.117	6.071	4.924	5.625	5.574	5.372	4.793	4.790	4.894	4.314	4.386	4.891	5.647	5.010
Cerebro-spinal fever	.202	.105	.177	.266	.236	.270	.197	.151	.158	.186	.205	.166	.198	.105
Intermittent fever	.013	.058	.033	.023	.010	.010	.031	....	....	.009	....	....	.018	....
Remittent fever	.081	.082	.044	.011	.010	....	.020	.053	....	.109	....	....	.009	.008
Pyemia	.175	.048	.155	.233	.154	.176	.114	.183	.138	0.98	.078	.127	.141	.080
Syphilis, congenital	.243	.128	.221	.133	.184	.280	.218	.215	.268	.254	.214	.392	.198	.106
Syphilis, tertiary	.094	.093	.088	.100	.133	.051	.503	.075	.079	.039	.097	.029	.047	.026
Septicæmia	.175	.187	.122	.133	.277	.270	.322	.280	.228	.166	.175	.176	.274	.249
Yellow fever	....	....	....	....	....	.010	.010	....	....	....	....	....	....	....

.2248
.419
1.232
.3268
[illegible]
.171
.034
1.112

Table VI. — Yearly Percentage of Principal Infectious Diseases from 1879 to 1906. — *Concluded.*

	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906
Smallpox	.034	.190	....	....	....	....	.045	....	.655	1.730	.122	....	.009	....
Measles	.230	.069	.167	.234	.188	.248	.595	.753	.911	.601	.470	.827	.490	.535
Scarlatina	2.118	1.666	1.006	1.040	1.219	.303	.662	1.549	1.858	.792	.611	.362	.400	.342
Diphtheria	4.064	7.092	5.190	4.435	3.684	1.562	2.480	4.598	3.124	1.730	2.013	1.915	1.199	1.332
Croup	.597	.529	.582	.481	.403	.138	.242	....	....	.319				
Whooping-cough	.341	.963	.414	.576	.349	.625	.680	.848	.575	1.202	1.016	.270	.263	.981
Typhoid fever	1.263	1.223	1.438	1.392	1.551	1.699	1.477	1.224	1.257	1.265	1.119	1.225	1.063	1.069
Erysipelas	.478	.277	.300	.258	.287	.276	.376	.454	.451	.592	.320	.576	.427	.386
Puerperal fever	.239	.138	.123	.172	.117	.073	.098	.248	.274	.291	.216	.167	.236	.166
Dysentery	.333	.329	.379	.378	.161	.377	.277	.051	.248	.328	.207	.186	.136	.228
Cholera morbus	.119	.199	.132	.249	.152	.138	.143	.128	.039	.073	.666	.074	.082	.053
Cholera infantum	4.261	4.939	4.413	4.942	3.586	4.051	2.507	2.560	1.858	1.694	1.693	1.915	1.653	1.087
Cerebro-spinal fever	.128	.156	.132	.180	1.659	.891	.788	.565	.478	.565	.442	.344	1.290	.727
Intermittent fever	.051	.034	.044	.043	.009	.009	.009	.051	.009	.173	....	.019	.018	.009
Remittent fever	.017	.130	.008	.009	....	.009	....	.590	....	....	....	....	....	....
Pyemia	.111	.190	.044	.069	.054	.064	.107	....	....	.810	.620	.716	....	....
Syphilis, congenital	.153	.078	.229	.344	.197	.165	.197	.171	.194	.155	.188	.214	.245	.245
Syphilis, tertiary	.068	.052	.070	.051	.080	.083	.045	.085	.115	.091	.122	.121	.054	.149
*Septicæmia	.367	....	.547	.456	.600	.569	.546	.856	.867	.810	.621	.716	.554	.640
Yellow fever	....	....	....	....	.009	....	....	....	....	....	....	....	....	....

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* Pyemia included in 1905 and 1906.

Table VII.—Deaths from Ten of the Principal Causes.

		Total Deaths from each Cause.	Percentage of each Cause to Total Mortality.	Death per 1,000 Inhabitants.	Total Deaths by Sex.		Total Deaths by Sex under five years.		Total Deaths under five years.	Percentage of each Cause under Five Years to Total Mortality.	
					M.	F.	M.	F.			
1233	Pneumonia	1,331	11.664	2.209	666	665	310	291	601	5.267	226
1138	Pulmonary Laryngeal and General Tuberculosis	1,185	10.385	1.967	635	550	24	28	52	.456	44
1211	Heart Disease	1,118	9.798	1.856	574	544	15	16	31	.272	26
852	Congenital Debility, Scleremia, etc.	964	8.448	1.600	562	402	562	402	964	8.448	852
842	Violent Deaths	684	5.994	1.135	507	177	47	40	87	.762	94
627	Bright's Disease and Nephritis	630	5.521	1.046	334	296	8	4	12	.105	26
580	Diarrhœa, Enteritis, etc.	618	5.416	1.026	310	308	277	253	530	4.645	506
611	Cancer and other malignant Tumors,	586	5.135	.973	222	364	3	3	6	.053	6
513	Cerebral Hemorrhage and Congestion	526	4.609	.873	252	274	8	4	12	.105	13
261	Bronchitis	264	2.314	.438	121	143	63	52	115	1.078	106

Table VIII.—Total Deaths each Quarter of the last Five Years, with the Aggregate and Average Number from 1897 to 1901, inclusive.

	1902.	1903.	1904.	1905.	1906.	5 years, 1896-1900.	
						Aggregate.	Average.
First quarter	2,868	2,982	2,963	2,907	2,993	15,008	3,002
Second quarter	2,645	2,515	2,598	2,677	2,797	13,468	2,694
Third quarter	2,647	2,594	2,625	2,821	2,834	14,404	2,880
Fourth quarter	2,823	2,541	2,571	2,602	2,787	13,305	2,661
Total, each year	10,983	10,632	10,757	11,007	11,411	56,185	11,237

Table IX.—Total Deaths and Percentages each Quarter for the Year 1906, with Aggregates and Percentages for the Ten Years Previous.

3162
[illegible]
2840
2711
2973

	1906.		1896-1905.	
	Deaths.	Per cent.	Deaths.	Per cent.
First quarter	2,993	26.23	29,625	26.64
Second quarter	2,797	24.51	26,710	24.02
Third quarter	2,834	24.84	28,410	25.55
Fourth quarter	2,787	24.42	26,453	23.79
Total	11,411	100.00	111,198	100.00

Table X.—The Number and Percentages of Deaths in each Quarter of each Year during a Period of Forty-two Years, 1865-1906, inclusive.

YEARS.	FIRST QUARTER.		SECOND QUARTER.		THIRD QUARTER.		FOURTH QUARTER.		Rate Per 1,000 Inhabitants.[1]
	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.	Deaths.	Per cent.	
1865	1,115	24.55	1,068	23.52	1,353	29.80	1,005	22.13	23.61
1866	999	22.81	957	21.85	1,338	30.56	1,085	24.78	22.51
1867	1,071	24.22	950	21.49	1,191	26.94	1,209	27.35	22.38
1868	1,341	24.30	1,203	21.80	1,736	31.45	1,239	22.45	23.89
1869	1,374	24.88	1,297	23.48	1,562	28.28	1,290	23.36	23.54
1870	1,395	22.88	1,314	21.55	1,983	32.52	1,406	23.05	24.34
1871	1,411	23.97	1,299	22.06	1,842	31.28	1,336	22.69	22.82
1872	1,697	20.97	1,777	21.97	2,511	31.04	2,105	26.02	30.43
1873	2,115	26.88	1,726	21.93	2,278	28.95	1,750	22.24	28.75
1874	1,805	23.11	1,818	23.27	2,278	29.16	1,911	24.46	23.57
1875	2,190	24.17	2,011	22.20	2,680	29.58	2,179	24.05	26.50
1876	2,246	27.21	1,800	21.92	2,375	28.78	1,823	22.09	20.86
1877	1,723	23.55	1,613	22.05	2,317	31.67	1,663	22.73	20.89
1878	1,743	22.82	1,744	22.84	2,174	28.47	1,975	25.87	21.55
1879	1,947	26.32	1,615	21.83	1,959	26.48	1,877	25.37	20.63
1880	2,015	23.62	1,829	21.45	2,500	29.30	2,187	25.63	23.51
1881	2,332	25.86	2,021	22.42	2,466	27.35	2,197	24.38	24.48
1882	2,104	23.39	2,212	24.59	2,489	27.67	2,190	24.35	24.07

1883	2,268	23.28	2,409	24.74	2,757	28.31	2,306	23.67	25.69
1884	2,284	23.73	2,103	21.85	2,725	28.33	2,510	26.09	25.01
1885	2,510	26.10	2,484	25.82	2,592	26.95	2,032	21.13	24.64
1886	2,214	23.89	2,113	22.79	2,580	27.84	2,361	25.48	23.09
1887	2,362	23.45	2,281	22.65	2,912	28.90	2,518	25.00	21.41
1888	2,790	27.36	2,420	23.73	2,649	25.98	2,338	22.93	24.03
1889	2,437	23.75	2,543	24.78	2,854	27.82	2,425	23.64	23.52
1890	2,911	28.60	2,244	22.04	2,699	26.51	2,928	22.85	22.70
1891	2,442	23.10	2,540	24.03	2,835	26.82	2,754	26.05	23.09
1892	2,998	26.68	2,582	22.98	2,958	26.33	2,698	24.01	24.04
1893	2,969	25.35	2,847	24.31	3,013	25.74	2,881	24.60	24.55
1894	2,972	25.80	2,592	22.50	3,182	27.62	2,774	24.08	23.66
1895	2,995	26.44	2,574	22.72	3,027	26.72	2,733	24.12	22.60
1896	2,897	24.99	2,807	24.13	3,319	28.53	2,611	22.44	22.53
1897	2,022	27.09	2,802	25.12	2,833	25.40	2,497	22.39	21.08
1898	2,599	23.87	2,512	23.08	3,051	28.03	2,724	25.02	20.09
1899	2,987	26.75	2,632	23.57	2,800	25.07	2,748	24.61	20.12
1900	3,368	28.84	2,778	23.97	2,906	24.89	2,626	22.48	20.82
1901	3,032	26.83	2,744	24.29	2,814	24.90	2,710	23.98	19.91
1902	2,868	26.11	2,645	24.08	2,647	24.10	2,823	25.71	19.01
1903	2,982	28.05	2,515	23.65	2,594	24.40	2,541	23.90	18.29
1904	2,963	27.55	2,598	24.15	2,625	24.40	2,571	23.90	18.28
1905	2,907	26.41	2,677	24.32	2,821	25.63	2,602	23.64	18.49
1906	2,993	26.23	2,797	24.51	2,834	24.84	2,787	24.42	18.94

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[1] Population estimated in non-census years on Dr. Farr's formula.

Table XI. — Parentage of Children by Sex and under One, Two and Five Years for each Month during Year 1906.

	JANUARY.						FEBRUARY.						MARCH.						APRIL.						MAY.						JUNE.					
	Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
United States	25	22	5	4	6	5	19	27	4	4	5	5	25	20	11	9	5	4	27	24	8	6	5	7	21	25	3	7	4	8	23	15	7	2	3	3
Ireland	11	14	6	3	6	5	7	16	5	2	4	4	11	9	5	4	1	9	13	10	3	3	6	4	18	13	1	3	2	5	5	11	1	2	3	3
British Provinces	8	1	1	2	1	1	5	8	1	1	...	2	8	2	...	1	2	2	7	5	2	2	4	3	5	5	2	...	...	4	4	8	1	2	1	1
Italian	16	4	4	6	1	6	12	7	5	4	3	1	23	6	13	5	5	2	18	11	3	6	3	2	14	7	6	2	3	1	6	8	3	4	1	1
Russian	8	6	1	...	1	1	4	2	4	2	1	2	4	7	6	2	2	2	7	6	2	...	2	1	7	2	4	2	2	4	5	8	2	1	3	...
Others foreign	13	11	4	4	1	2	9	7	3	4	3	1	5	6	...	1	2	1	7	1	...	1	...	1	5	3	5	...	2	2	7	3	2	1	...	1
Mixed	12	6	4	4	7	4	16	6	5	2	8	3	30	14	8	2	9	8	22	17	5	5	2	6	35	15	7	6	8	2	14	10	...	1	4	2
One parent known	19	7	2	...	...	1	12	8	...	2	1	1	8	5	1	2	1	1	17	3	...	...	...	...	8	8	1	1	...	2	13	12	...	1	1	...
Unknown	3	1	...	...	...	1	1	2	...	1	...	...	1	2	...	1	1	...	5	1	...	1	...	...	4	2	1	...	...	...	4	1	...	1	...	...
Total	115	72	27	23	23	26	85	83	27	22	25	19	115	71	44	27	28	24	123	78	23	24	22	24	117	80	30	21	21	28	81	71	17	14	16	11

	JULY.						AUGUST.						SEPTEMBER.						OCTOBER.						NOVEMBER.						DECEMBER.					
	Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.		Under 1 yr.		1 yr. and under 2 yrs.		2 yrs. and under 5 yrs.	
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
United States	28	24	4	2	5	8	63	28	5	9	3	3	43	38	3	5	4	2	33	23	3	5	3	1	21	22	4	5	1	2	18	22	4	2	5	2
Ireland	15	20	3	4	5	1	28	23	5	1	4	1	32	24	7	6	4	...	12	10	2	5	4	5	16	9	1	5	5	2	11	6	2	1	3	6
British Provinces	10	6	5	...	4	2	11	9	1	...	2	2	8	7	1	2	...	...	4	2	1	...	...	...	6	2	...	1	...	...	4	2	...	...	1	...
Italian	15	8	...	...	1	1	13	13	2	4	...	...	16	8	12	4	...	1	4	8	2	2	3	...	10	6	...	2	1	2	14	8	5	3	3	3
Russian	14	6	3	3	2	2	8	12	2	...	1	1	10	7	2	2	...	...	8	5	2	2	2	3	5	5	1	2	2	2	6	3	1	...	1	1
Others foreign	10	9	1	2	...	...	24	18	6	2	1	7	9	15	1	3	2	1	8	7	1	2	1	2	8	7	2	2	1	2	6	8	...	...	2	1
Mixed	19	17	4	4	4	2	27	34	6	3	3	8	14	18	3	2	1	3	21	12	8	3	2	1	16	13	...	2	3	4	17	12	2	4	4	3
One parent known	19	7	1	...	...	...	18	19	...	...	...	...	3	12	1	...	1	...	10	13	...	...	...	...	9	5	1	1	...	...	5	8	1	...	...	1
Unknown	5	8	...	...	...	...	4	10	2	...	...	...	4	3	...	...	...	...	2	4	...	1	...	...	1	4	...	...	...	1	6	2	...	...	1	...
Totals	135	105	21	15	21	16	191	166	29	19	14	17	139	132	30	24	12	7	102	84	14	20	15	12	92	73	9	20	13	15	87	71	15	10	20	17

Table XI.—Parentage of Children by Sex and under One, Two and Five Years for each Month,

Table XII.—Cases Reported, and Deaths from Smallpox, Diphtheria, Scarlet Fever, Typhoid Fever and Measles, with Percentages.

DATE.	SMALLPOX.		Percentages.	DIPHTHERIA AND CROUP.		Percentages.	SCARLET FEVER.		Percentages.	TYPHOID FEVER.		Percentages.	MEASLES.		Percentages.
	Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.		Cases.	Deaths.	
1872	2,592	738	28.4												
1873	1,103	302	27.3												
1874	7	2	28.5												
1875	5	1	20.0												
1876	6	2	33.33												
1877	17	4	23.5	....	....	....	1,334	104	7.7						
1878	....	....	....	1,370	569	41.53	848	68	8.0						
1879	....	....	....	1,167	545	46.70	951	149	16.6						
1880	4	1	25.0	1,715	774	45.13	497	33	6.6	Oct. 1 to Dec. 31.	Oct. 1 to Dec. 31.				
1881	44		13.6	1,680	802	47.74	383	35	9.1	335	76	26.8	June 1 to Dec. 31.		
1882	24		33.3	1,386	575	41.63	689	75	10.9	808	212	26.2			
1883	8		12.4	1,415	608	42.97	1,408	211	14.7	887	198	22.3	409	152	†
1884	1	1	100.0	1,212	487	40.18	2,526	209	8.2	948	216	22.6	201	13	6.47
1885	11	1	9.0	1,263	450	35.63	1,665	156	9.2	767	152	19.8	1,699	84	4.94
1886	1	....	....	1,188	423	35.60	1,149	81	7.0	814	135	16.5	783	36	4.59
1887	4	....	....	1,049	410	39.08	1,549	195	12 58	940	183	19.46	2,273	119	5.23
1888	8	1	12.4	1,411	589	41.17	707	65	9.19	924	170	18.39	1,517	27	1.77
1889	10	2	20.0	1,814	683	27.65	464	23	4.96	1,071	186	17.37	2,399	48	2.00
1890	1	....	....	1,475	462	31.32	924	42	4.54	847	135	18.29	1,109	19	1.71
1891	....	....	....	831	285	34.29	1,327	64	4.82	966	154	15.94	2,568	21	.82
1892	....	....	....	1,353	481	35.55	2,938	262	8.91	765	137	17.90	1,563	19	1.21
1893	26	4	15.3	1,465	546	37.27	2,580	248	9.61	824	148	17.96	3,699	27	.73
1894	77	22	28.5	3,019	878	29.07	2,230	192	8.60	915	141	15.41	913	8	.88
1895	....	....	....	4,059	854	16.11	1,612	114	7.07	1,026	163	15.88	2,733	19	.69
1896	....	....	....	4,489	572	12.74	1,216	121	9.95	1,076	162	15.06	3,043	27	.89
1897	10	....	....	3,398	456	13.42	1,938	136	7.02	609	173	28.40	4,539	21	.46
1898	....	....	....	1,661	185	11.14	877	33	3.76	555	185	33.33	2,177	27	1.24
1899	*29	5	17.24	2,836	304	10.72	1,381	74	5.36	765	165	21.57	4,110	33	.80
1900	7	....	....	4,977	537	10.79	1,7	181	10.58	730	143	19.59	2,465	89	3.61
1901	504	74	14.68	3,319	353	10.63	1,39	210	15.02	713	141	19.77	4,462	103	2.31
1902	1,024	190	18.55	1,986	225	11.33	1,122	87	7.75	910	139	15.27	3,772	66	1.75
1903	68	13	19.12	2,073	214	10.32	1,479	65	4.39	890	119	13.37	2,305	50	2.17
1904	....	....	....	2,538	206	8.12	966	39	4.03	858	135	15.73	4,662	89	1.91
1905	5	1	20.00	1,550	132	8.52	1,131	44	3.89	848	117	13.80	1,983	54	2.72
1906	9	....	....	2,172	152	7.00	1,341	39	2.90	989	122	12.34	4,840	61	1.26

* Including one case and one death at Quarantine.

† This percentage is not calculated, as the cases were only reported for a part of the year.

Table XIV. — Deaths of White and Colored with Death-rates per 1,000 Inhabitants to Total Deaths, and Deaths from Pneumonia, Cancer, Heart Disease and Kidney Diseases with Death Rates per 10,000 Inhabitants, from 1840 to 1906, inclusive.

YEARS.	POPULATION.	DEATHS.			Death rate per 1,000 Inhabitants.	Deaths from Pneumonia.	Death rate per 10,000 Inhabitants.	Deaths from Cancer.	Death rate per 10,000 Inhabitants.	Deaths from Heart Disease.	Death rate per 10,000 Inhabitants.	Deaths from Kidney Diseases.	Death rate per 10,000 Inhabitants.
		White.	Colored.	Total.									
1840	84,311	....	....	1,972	23.39	135	16.01	17	2.02	15	1.78	....	....
1841	89,614	....	....	1,919	21.41	106	11.83	11	1.23	28	3.12	....	....
1842	95,251	....	....	2,426	25.47	181	19.00	10	1.05	42	4.40	....	....
1843	101,242	....	....	2,197	21.70	167	16.49	14	1.38	34	3.36	....	....
1844	107,610	....	....	2,241	20.82	132	12.26	27	2.50	38	3.53	....	....
1845	114,366	....	....	2,585	22.60	168	14.60	15	1.31	33	2.88	....	....
1846	118,551	....	....	3,398	28.69	234	19.74	19	1.60	42	3.54	....	....
1847	122,890	....	....	4,122	33.54	193	15.70	13	1.06	58	4.72	....	....
1848	127,387	....	....	3,972	31.18	190	14.91	22	1.73	62	4.87	....	....
1849	132,048	....	....	5,079	38.46	265	20.07	18	1.36	82	6.21	12	.91
1850	136,881	3,583	85	3,668	26.80	290	21.19	29	2.12	52	3.80	6	.44
1851	141,308	3,790	66	3,856	27.29	262	18.54	19	1.34	86	6.09	6	.42
1852	145,878	3,676	60	3,736	25.61	226	15.49	32	2.19	79	5.42	3	.20
1853	150,595	4,226	58	4,284	28.46	245	16.27	22	1.46	78	5.18	12	.80
1854	155,464	4,366	77	4,443	28.58	260	16.72	23	1.48	83	5.34	3	.19
1855	160,494	4,017	63	4,080	25.42	220	13.70	31	1.93	95	5.92	23	1.43
1856	163,820	4,182	71	4,253	25.96	258	15.75	16	.98	115	7.02	7	.43
1857	167,218	3,885	73	3,958	23.67	108	6.46	29	1.73	102	6.10	10	.60
1858	170,685	3,780	60	3,840	22.50	105	6.15	41	2.40	96	5.62	10	.59
1859	174,227	3,680	58	3,738	21.45	191	10.96	45	2.58	107	6.14	13	.75
1860	177,840	4,322	68	4,390	24.68	....	....	....	....	....	....	....	....
1861	180,640	3,911	54	3,965	21.95	....	....	....	....	....	....	....	....
1862	183,497	4,073	47	4,120	22.45	256	13.95	50	2.72	115	6.27	23	1.25
1863	186,390	4,597	102	4,699	29.16	329	17.65	52	2 79	135	7.24	35	1.87
1864	189,331	5,002	109	5,111	26.99	382	20.18	50	2.64	142	7.50	51	2.70
1865	192,318	4,448	93	4,541	23.61	314	16.23	57	2.96	125	6.50	53	2.76
1866	194,506	4,288	91	4,379	22.51	334	17.17	78	4.01	137	7.04	56	2.88

1867	227,523	4,318	108	4,421	19.43	227	9.98	82	3.60	139	6.11	61	2.68
1868	231,024	5,429	90	5,519	23.89	358	15.50	85	3.67	172	7.44	82	2.55
1869	246,541	5,377	146	5,523	22.40	402	16.30	107	4.34	159	6.44	107	4.34
1870	250,526	5,697	133	6,100	24.35	336	13.41	111	4.43	196	7.82	121	4.83
1871	258,032	5,762	126	5,888	22.82	527	20.42	102	3.95	239	9.62	142	5.50
1872	265,764	7,917	173	8,090	30.44	517	19.45	104	3.91	207	7.79	170	6.70
1873	321,200	7,624	245	7,869	24.50	463	14.41	141	4.39	144	4.48	149	4.64
1874	331,395	7,614	198	7,812	23.57	571	17.23	140	4.22	328	9.90	172	5.19
1875	341,919	8,901	159	9,060	26.50	632	18.48	103	3.01	322	9.42	142	4.15
1876	346,004	8,099	154	8,253	23.85	523	15.11	164	4.73	369	10.66	126	3.64
1877	350,138	7,142	174	7,316	20.89	484	13.82	190	5.43	285	8.14	176	5.02
1878	354,322	7,492	144	7,636	21.55	581	16.40	196	5.53	359	10.13	204	5.76
1879	358,554	7,202	196	7,398	20.63	613	17.10	195	5.44	383	10.68	298	5.52
1880	362,839	8,363	168	8,531	23.51	650	17.91	229	6.31	425	11.71	226	6.23
1881	368,190	8,782	234	9,016	24.49	684	18.58	241	6.55	465	12.63	259	7.03
1882	373,620	8,787	208	8,995	24.07	681	18.23	253	6.77	509	13.62	279	7.47
1883	379,129	9,513	227	9,740	25.69	757	19.97	293	7.73	528	13.93	280	7.39
1884	384,720	9,374	248	9,622	25.01	764	19.86	282	7.33	530	13.78	306	7.95
1885	390,393	9,386	232	9,618	24.64	963	24.67	274	7.02	563	14.42	343	8.79
1886	401,374	9,052	216	9,268	23.09	778	19.38	299	7.45	581	14.47	340	8.47
1887	412,663	9,824	249	10,073	24.41	795	19.26	324	7.85	619	15.00	331	8.02
1888	424,274	9,952	245	10,197	24.03	990	23.33	279	6.58	668	15.74	335	7.90
1889	436,208	10,019	240	10,259	23.52	934	21.41	306	7.01	789	18.09	319	7.31
1890	448,477	9,920	261	10,181	22 70	1,092	24.35	326	7.27	783	17.46	297	6.62
1891	457,772	10,301	270	10,571	23.09	1,149	25.10	317	6.92	764	16.69	324	7.08
1892	467,260	10,951	285	11,236	24.05	1,222	26.15	328	7.02	890	19.07	356	7.40
1893	476,945	11,427	283	11,710	24.55	1,540	32.29	310	6.50	785	16.46	376	7.88
1894	486,830	11,222	298	11,520	23.66	1,119	22.99	354	7.27	839	17.23	373	7.66
1895	501,083	11,034	295	11,329	22.60	1,268	25.30	391	7.80	870	17.36	377	7.52
1896	516,305	11,310	323	11,634	22.53	1,387	26.86	389	7.53	861	16.87	410	7.94
1897	528,912	10,862	292	11,154	21.09	1,236	23.36	400	7.56	913	17.26	409	7.73
1898	541,827	10,620	266	10,886	20.09	1,169	21.57	412	7.60	934	17.23	403	7.44
1899	555,057	10,858	309	11,167	20.12	1,455	26.21	402	7.24	966	17.40	428	7.71
1900	560,892	11,386	292	11,678	20.82	1,241	22.13	452	8.06	1,009	17.99	422	7.52
1901	567,617	11,008	292	11,300	19.91	1,099	19.36	455	8.82	963	16.97	534	9.41
1902	574,465	10,645	338	10,983	19.01	1,115	19.41	482	8.39	1,033	17.96	556	9.68
1903	581,357	10,335	297	10,632	18.29	1,265	21.76	511	8.81	992	17.06	563	9.68
1904	588,320	10,469	288	10,757	18.28	1,323	22.49	565	9.60	1,056	17.95	543	9.23
1905	595,380	10,750	257	11,007	18.49	1,274	21.40	628	10.55	1,082	18.17	568	9.54
1906	602,526	11,097	314	11,411	18.94	1,331	22.09	586	9.73	1,118	18.56	630	10.46
1907	609,757	11,393	293	11,686	19.16	1233	20.22	611	10.02	1211	19.86	627	10.28

Comparative Deaths in American and Foreign Cities.

The following tables have been prepared to show the comparison of deaths in a few large American and foreign cities, as compared with the City of Boston. It is to be regretted that the amount of information desired is not fully complete, owing to the scarcity of material and information furnished, but, in their present condition, as a matter of reference, they may be of value:

Table XVI. — Boston.

Years.	Population.	Total Deaths.	Population of Children under 5 years of age.[1]	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880..........	362,839	8,531	29,649	3,349	588	33	154	49
1881..........	368,190	9,016	30,809	3,314	601	35	207	108
1882..........	373,623	8,995	31,969	3,151	458	75	212	25
1883..........	379,129	9,740	33,129	3,627	445	211	198	152
1884..........	384,720	9,622	34,289	3,570	345	209	216	13
1885..........	390,393	9,618	35,449	3,466	334	156	152	84
1886..........	401,374	9,268	36,582	3,186	329	81	135	36
1887..........	412,663	10,073	37,717	3,662	316	195	183	119
1888..........	424,274	10,197	38,849	3,509	470	65	170	27
1889..........	436,208	10,259	39,983	3,633	564	23	186	48
1890..........	448,477	10,181	40,001	3,349	401	42	155	19
1891..........	457,772	10,571	41,358	3,608	232	64	154	21
1892..........	467,260	11,236	42,715	3,735	414	262	137	19
1893..... ...	476,945	11,710	44,072	3,987	476	248	148	27
1894..	486,830	11,520	45,430	4,108	817	192	141	8
1895..........	501,083	11,329	46,787	3,935	588	114	163	19
1896..........	516,305	11,634	48,902	4,055	516	121	162	27
1897..........	528,912	11,154	51,017	3,708	411	136	173	21
1898..........	541,827	10,886	53,131	3,577	170	33	185	27
1899..........	555,057	11,167	55,246	3,591	277	74	165	33
1900..........	560,892	11,678	57,361	3,752	[2] 537	181	143	88
1901..........	567,617	11,300	59,476	3,469	[2] 353	210	142	103
1902..........	574,465	10,983	61,591	3,367	225	87	139	66
1903..........	581,357	10,632	63,706	3,079	214	65	119	50
1904..........	588,320	10,757	65,821	3,105	206	39	135	89
1905..........	595,380	11,007	67,936	3,024	132	44	117	54
1906..........	602,526	11,411	70,051	3,439	152	39	122	61

[1] Estimated. [2] The deaths from diphtheria since 1899 include membraneous croup.

V

Ta[illegible] [illegible] —(Old City of) New York, N. Y.

YEARS.	Population.	Total Deaths.	Population of Children under [illegible] years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880[1]	1,209,268	31,937	140,673	14,650	1,890	618	372	479
1881	1,246,011	38,642	144,947	17,737	2,249	1,964	594	429
1882	1,283,870	37,924	149,351	17,520	1,525	2,066	516	913
1883	1,322,880	34,011	153,899	13,856	1,009	744	625	716
1884	1,363,075	35,044	158,565	15,272	1,090	608	476	762
1885	1,404,401	35,682	163,383	15,267	1,325	559	405	736
1886	1,447,166	37,351	168,347	16,121	1,727	371	433	668
1887	1,491,137	38,933	173,462	16,766	2,167	569	421	767
1888	1,536,444	40,175	178,733	17,358	1,914	1,361	364	591
1889	1,583,120	39,679	184,164	17,152	1,686	1,242	397	470
1890	1,631,232	40,103	189,760	16,305	1,262	408	352	730
1891	1,680,796	43,659	195,525	18,224	1,361	1,220	384	663
1892	1,708,124	44,317	....	18,589	1,425	975	399	863
1893	1,758,010	44,479	... .	17,914	1,968	552	381	390
1894	1,809,353	41,175	....	17,596	2,359	541	326	584
1895	1,873,201	43,420	210,523	18,221	1,634	468	322	793
1896[2]	1,906,139	41,622	210,523	16,807	1,555	402	297	714
1897	1,940,553	38,887	226,327	15,394	1,377	500	299	391
1898	1,976,572	40,438	233,150	15,591	922	524	376	446
1899	2,014,330	39,911	240,714	14,391	940	332	394	379
1900	2,053,979	43,227	233,537	15,646	1,121	315	372	470
1901	2,095,686	43,307	239,703	14,810	1,227	635	412	272
1902	2,139,632	41,704	245,202	15,019	1,142	635	400	462
1903	2,186,017	41,776	250,517	13,741	1,232	465	350	321
1904	2,235,060	48,743	256,137	16,136	1,272	534	309	556
1905	2,390,382	45,199	273,937	15,287	860	271	310	314
1906	2,464,432	46,108	282,423	15,534	983	212	369	662

432

1907

[1] Estimated.

[2] Estimated July 1, 1896.

1907 2,541,[illegible] | 47,[illegible] | 291,[illegible] | 15,645 | 1,115 | 420 | 42[illegible]

18.77

Table XVIII. — Philadelphia, Pa.

YEARS.	Population.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880[1]	846,980	17,711	[1] 91,544	6,594	323	291	498	108
1881	868,000	19,515	[2] 92,744	7,124	457	486	645	17
1882	886,539	20,059	94,044	7,254	933	810	650	91
1883	907,041	20,076	95,234	7,417	1,006	561	579	58
1884	927,995	19,999	96,465	7,606	680	540	662	96
1885	949,432	21,392	97,965	8,188	600	375	610	131
1886	971,363	20,005	98,925	7,351	411	248	618	19
1887	993,801	21,719	100,155	8,421	416	159	621	358
1888	1,016,758	20,372	101,386	7,269	350	235	785	24
1889	1,040,245	20,536	102,616	7,752	375	298	736	92
1890[1]	1,046,964	21,732	[1] 103,847	7,913	528	189	666	105
1891	1,069,264	23,367	105,077	8,479	918	341	684	25
1892	1,092,168	24,305	....	9,305	1,425	484	539	74
1893	1,115,562	23,655	....	8,690	892	267	456	88
1894	1,139,457	22,680	....	8,160	1,047	154	369	33
1895	1,163,864	23,797	....	8,401	1,020	79	469	84
1896	1,188,793	23,982	....	8,661	862	61	402	191
1897	1,214,256	22,735	....	7,605	1,231	282	401	64
1898	1,240,266	23,790	....	7,998	998	114	[3] 639	234
1899	1,266,832	23,796	....	7,056	849	132	948	7
1900	1,293,697	25,078	....	8,078	898	163	449	382
1901	1,321,408	24,137	....	6,840	525	219	444	26
1902	1,349,712	23,847	....	6,922	435	143	588	112
1903	1,378,624	25,947	....	7,079	521	159	744	220
1904	1,408,154	25,972	142,771	7,369	542	201	957	141
1905	1,438,318	24,807	145,845	6,978	452	60	684	53
1906	1,469,126	27,372	....	8,525	546	56	1,063	344

[1] Census years.

[2] Estimated on the increase of census years.

[3] Seventy-three of these were soldiers who contracted the disease in camps.

[illegible] 1,5[illegible] | 27,4[illegible] | 147,9[illegible] | 7669 | 509 | 101 | 59[illegible] | 65

18.30

Table XIX. — Chicago, Ill.

YEARS.	Population Estimated.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880............	503,298	10,462						
1881............	540,000	13,874						
1882............	560,639	13,234	....	6,645				
1883............	580,000	11,555	....	5,875				
1884............	630,000	12,471	....	6,666				
1885............	665,000	12,474	....	6,187	706	279	496	78
1886............	704,000	13,699	....	6,763	944	220	483	126
1887............	760,000	15,400	....	7,568	1,002	190	381	341
1888............	830,000	15,772	....	7,533	858	184	375	151
1889............	1,106,000	16,946	....	8,204	1,126	185	453	204
1890............	1,200,000	21,869	....	9,954	881	193	1,008	67
1891............	1,250,000	27,754	....	12,801	958	499	1,997	265
1892............	1,438,000	26,219	....	11,662	1,014	382	1,489	185
1893............	1,600,000	27,095	....	12,364	975	329	670	234
1894............	1,567,727	23,701	....	12,363	841	190	491	182
1895............	1,600,000	24,319	227,200	10,449	1,775	77	518	158
1896............	[1] 1,619,226	23,262	192,453	15,336	955	54	75[illegible]	73
1897............	1,619,226	21,809	192,453	8,546	702	81	437	139
1898............	1,650,000	22,747	196,193	8,135	622	67	636	55
1899............	1,950,000	25,503	196,299	8,880	843	533	442	168
1900............	1,698,575	24,941	220,824	8,282	797	226	337	194
1901............	1,758,025	24,406	....	7,489	495	165	509	158
1902............	1,820,000	26,455	204,061	8,027	596	445	801	123
1903............	1,885,000	28,923	211,200	7,879	614	296	588	276
1904............	1,932,315	26,302	202,893	7,052	395	143	373	47
1905............	1,990,750	27,212	222,601	8,512	426	79	329	231
1906............	2,049,185	29,048	210,041	8,792	547	493	370	128

[1] School census, July 1, 1896.

1907 | 2,107,620 | 32,143 | 213,713 | 1077 | 53[illegible] | 715 | 376 | 255

15.25

Table XX.—Brooklyn, N. Y.

YEARS.	Population.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.	Deaths from Consumption.
1885.........	687,000	15,369	89,310	6,756	519	363	153	175	1,995
1886.........	747,000	15,790	97,110	7,000	782	340	123	106	2,085
1887.........	778,800	17,079	101,140	7,577	950	271	143	172	2,026
1888.........	810,000	18,061	105,300	8,019	984	475	153	59	2,051
1889.........	842,000	18,480	109,460	8,265	1,101	273	161	205	2,055
1890.........	875,000	19,827	113,750	8,462	902	227	182	111	2,169
1891.........	910,000	21,349	118,300	9,388	766	485	180	203	2,117
1892.........	898,256	20,807	122,850	8,971	775	412	162	168	2,128
1893.........	928,408	21,017	127,400	8,763	607	307	179	111	2,174
1894.........	959,572	21,183	135,850	9,235	1,279	188	158	204	2,260
1895.........	991,782	22,568	124,000	9,277	1,139	124	173	192	2,299
1896.........	1,025,074	22,497	146,000	9,006	1,063	150	163	333	2,245
1897.........	1,060,483	20,674	130,500	8,252	795	187	173	190	2,164
1898.........	1,095,047	21,856	134,793	8,414	742	159	267	193	2,384
1899.........	1,131,805	21,649	....	8,072	583	175	205	197	2,435
1900.........	1,169,796	23,057	[1]131,719	8,776	673	130	301	310	2,445
1901.........	1,209,064	23,271	124,500	8,151	733	496	274	160	2,474
1902.........	1,249,650	22,344	145,324	7,983	762	275	322	239	2,317
1903.........	1,291,597	22,192	....	7,068	830	244	267	167	2,376
1904.........	1,334,952	24,831	155,254	8,042	706	282	303	333	2,634
1905.........	1,362,352	23,985	158,441	7,794	594	132	297	193	2,420
1906.........	1,404,569	25,024	154,502	8,547	793	258	230	446	2,557

[1] Estimated.

1,4[illegible] | 26,043 | 165,413 | 8,392 | 603 | 321 | 271 | 285 | 2515

Table XXI. — St. Louis.

YEARS.	Population.	Total Deaths.	Deaths of Children under 5 years of age.	Deaths from Diphtheria. *Diph.-Croup.*	Deaths from Scarlet Fever.	Deaths from Typhoid Fever.	Deaths from Measles.	Deaths from Consumption.
1885	400,000	7,490	3,090	392 — 109	164	125	54	888
1886	400,000	8,268	3,434	719 — 160	149	124	6	915
1887	420,000	9,155	3,795	927 — 185	48	116	40	829
1888	440,000	9,015	3,659	564 — 167	30	130	31	800
1889	450,000	8,004	3,149	345 — 94	114	146	63	655
1890	460,000	8,409	3,115	186 — 58	87	140	1	843
1891	480,000	9,530	3,493	250 — 90	96	165	53	869
1892	500,000	10,225	3,607	195 — 91	150	441	7	882
1893	520,000	10,303	3,548	227 — 144	79	215	26	984
1894	540,000	8,710	3,192	240 — 139	29	171	3	875
1895	560,000	9,425	3,373	512 — 171	18	107	38	1,000
1896	570,000	9,897	3,326	273 —	11	108	17	1,026
1897	600,000	9,554	2,799	170 — 70	19	123	1	997
1898	623,000	8,908	3,358	152 — 51	28	95	21	1,001
1899	640,000	10,024	3,005	192 —	34	131	15	1,041
1900	575,200	9,849	....	344 — 64	57	148	45	1,006
1901	598,000	10,601	....	259 —	69	176	34	1,128
1902	621,000	10,853	2,671	160 —	132	222	10	1,181
1903	645,000	11,145	2,842	162 —	89	288	140	1,126
1904	685,000	11,506	2,443	136 —	64	225	88	1,328
1905	685,000	10,342	2,196	111 —	13	122	52	1,257
1906	710,000	9,980	2,304	105 —	18	111	10	1,315
	710,000,	10,326	6 c	53	24	102	77	1109

Table XXII. — London, England.

YEARS.	Population.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880...........	3,771,139	81,832	....	36,220	544	3,100	702	1,521
1881...........	3,824,960	81,071	497,044	33,325	654	2,108	977	2,533
1882...........	3,861,876	82,905	....	36,259	863	2,004	975	2,329
1883...........	3,901,164	80,578	....	33,552	951	1,989	935	2,420
1884...........	3,989,832	83,050	....	36,030	973	1,444	936	2,285
1885...........	3,978,883	80,000	....	32,913	896	707	585	2,928
1886...........	4,018,321	82,276	....	34,319	846	688	618	2,078
1887...........	4,058,150	82,304	....	35,236	953	1,419	612	2,904
1888...........	4,098,374	79,099	....	32,669	1,311	1,190	694	2,425
1889...........	4,138,996	76,026	....	30,469	1,616	771	528	2,308
1890...........	4,180,021	89,554	....	36,123	1,417	876	618	3,291
1891...........	4,221,452	90,216	501,558	33,340	1,361	589	547	1,807
1892...........	4,263,294	87,749	....	34,560	1,885	1,174	486	3,393
1893...........	4,306,411	91,536	....	35,200	3,265	1,596	719	1,661
1894...........	4,349,166	77,039	....	31,366	2,670	962	635	3,293
1895...........	4,392,346	86,937	....	35,095	2,316	829	614	2,633
1896...........	4,421,955	83,511	....	35,599	2,683	942	591	3,697
1897...........	4,463,169	80,944	....	32,238	2,263	781	593	1,928
1898...........	4,504,766	83,936	536,522	34,184	1,772	583	585	3,075
1899...........	4,506,752	89,689	541,523	32,073	1,964	398	801	2,143
1900...........	4,589,129	86,007	546,570	30,979	1,558	361	756	1,936
1901...........	4,544,983	79,924	....	....	1,344	584	548	1,958
1902...........	4,579,110	82,540	500,259	28,768	1,181	563	585	2,362
1903...........	4,613,812	72,019	504,050	25,627	[1] 752	362	[2] 396	2,054
1904[3]	4,649,038	76,694	....	....	753	365	297	2,264
1905[3]	4,684,794	73,002	518,794	24,838	553	549	246	1,715
1906[3]	4,721,217	73,990	515,784	25,300	703	533	275	1,918

[1] Excluding croup. [2] Including croup. [3] Deaths for 52 weeks.

4,[illegible] 76,[illegible] [illegible] 751 [illegible]

1471

Table XXIII. — Paris, France.

YEARS.	Population.	Total Deaths.	Population of Children under 5 years of age.[1]	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880..............	....	55,706	....	17,674	2,048	345	2,003	962
1881..............	2,239,938	55,103	148,601	17,159	2,211	440	1,955	897
1882..............	....	56,854	....	17,158	2,244	156	3,214	1,005
1883..............	....	54,763	....	16,843	1,781	88	1,880	1,043
1884..............	....	55,050	....	16,968	1,928	155	1,503	1,501
1885..............	....	52,726	....	15,244	1,655	191	1,320	1,524
1886..............	2,260,945	55,110	146,177	16,493	1,512	403	954	1,210
1887..............	....	52,836	....	15,206	1,585	224	1,885	1,628
1888..............	....	51,230	....	14,463	1,729	193	756	915
1889..............	....	54,083	....	14,679	1,706	170	1,008	1,190
1890..............	....	54,556	150,490	15,068	1,668	223	665	1,495
Census of 12th April, 1891 ...	2,424,705							
1891..............	2,424,705	54,443	150,490	14,048	1,531	208	549	1,020
1892..............	2,424,705	54,536	150,490	14,353	1,403	198	691	999
1893..............	2,424,705	52,955	....	13,046	1,266	177	570	677
1894..............	2,424,705	[2] 49,205	150,490	11,901	1,009	151	697	993
1895..............	2,424,705	51,451	....	....	421	179	274	682
1896..............	2,511,629	47,929	188,941	10,363	444	190	262	656
1897..............	2,511,629	46,988	156,494	10,528	298	65	249	821
1898..............	2,511,629	49,574	156,494	11,671	259	138	256	876
1899..............	2,511,629	50,511	....	....	336	196	754	901
1900..............	2,511,629	51,725	....	8,966	294	172	912	854
1901..............	2,660,494	50,195	....	10,237	628	113	363	578
1902..............	2,660,559	49,275	196,494	....	529	64	17	625
1903..............	2,660,559	46,557	....	....	396	135	280	441
1904..............	2,660,559	47,354	170,694	8,953	250	78	334	564
1905..............	2,722,731	47,647	[3] 170,694	8,617	169	78	294	570
1906..............	....	....	....	....	....	......	....	......

[1] Estimated, 1891.

[2] Inhabitants of Paris only.

[3] Census of 1901.

Table XXIV. — Vienna, Austria.

Years.	Population.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria and Croup.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880	721,016	20,453	58,023	8,219	597	172	171	98
1881	741,208	21,549	....	8,224	539	286	171	106
1882	749,919	21,595	....	8,908	522	410	187	203
1883	750,762	21,194	....	7,930	360	150	157	246
1884	759,849	20,352	....	7,688	342	130	95	344
1885	769,889	21,976	....	8,668	464	83	106	289
1886	780,066	20,869	....	8,114	546	124	85	338
1887	790,381	20,549	....	9,812	455	391	80	493
1888	800,836	20,349	....	7,547	521	230	107	253
1889	811,434	20,106	....	7,624	513	139	103	364
1890	822,176	20,324	69,710	7,853	536	92	77	459
1891	1,378,530	34,479	130,808	15,610	1,311	271	85	855
1892	1,406,933	35,134	....	16,843	1,580	242	116	825
1893	1,435,931	34,515	130,808	15,002	1,615	311	105	1,225
1894	1,465,637	33,994	140,545	15,073	1,679	413	74	898
1895	1,495,764	34,879	....	15,021	710	437	86	754
1896	1,526,628	34,132	....	14,685	621	436	79	930
1897	1,551,129	33,187	....	13,946	575	236	84	857
1898	1,590,295	32,356	....	13,593	520	227	93	794
1899	1,623,134	33,333	....	....	463	261	66	684
1900	1,656,662	34,308	160,233	13,650	306	168	137	741
1901	1,691,996	33,502	....	12,476	387	367	76	684
1902	1,726,604	33,857	....	13,399	438	277	51	769
1903	1,744,177	33,172	....	....	426	222	68	378
1904	1,797,992	32,931	....	12,270	386	65	60	1,021
1905	1,897,630	36,671	213,884	13,282	458	181	83	587
1906	....	......	....	....	....	......	....	......

Table XXV. — Glasgow, Scotland.

YEARS.	Population.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1880	....	13,303	....	6,071	150	453	278	331
1881 census	511,415	12,909	69,931	5,386	162	256	166	333
1882	....	12,985	....	5,972	177	263	162	213
1883	....	14,476	....	6,494	132	449	167	605
1884	....	13,839	....	6,174	157	412	184	335
1885	....	13,444	....	6,156	112	288	102	430
1886	....	13,053	....	5,601	111	345	81	90
1887	....	12,055	....	5,367	174	234	100	302
1888	....	11,533	....	4,743	168	163	59	205
1889	....	12,890	....	5,970	167	109	111	594
1890	....	13,222	....	5,768	139	124	108	583
1891 census	565,710	14,149	72,481	5,432	131	201	123	490
1892	669,059	15,128	84,860	6,306	162	304	102	781
1893	677,883	15,798	85,968	6,953	208	263	120	855
1894	686,820	13,674	87,108	5,326	245	204	150	250
1895	695,876	16,332	88,250	6,458	112	180	121	830
1896	705,052	14,388	89,413	6,153	83	139	139	814
1897	714,419	15,727	90,665	6,750	97	132	172	574
1898	724,349	15,383	91,861	6,580	103	188	223	536
1899	733,903	15,828	93,073	6,196	106	202	179	546
1900	755,730	15,924	....	6,487	125	210	158	461
1901	761,712	....	....	....	123	131	210	499
1902	775,601	15,054	....	....	127	113	110	266
1903	786,897	14,483	....	5,816	118	82	142	346
1904	798,357	14,794	95,164	5,913	91	69	84	328
1905	809,986	13,758	....	5,502	107	35	53	551
1906	835,625	14,889	99,682	5,447	147	48	90	394
	847,584	15,659	101,066	5[illegible]	131	45	[illegible]	[illegible]

Table XXVI. — Liverpool, England.

Years.	Population.	Total Deaths.	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
1884	541,031	14,382	....	6,908	80	197	112	611
1885	537,548	13,764	....	6,218	133	190	95	716
1886	534,068	13,919	....	6,152	125	277	140	273
1887	530,649	14,006	....	6,218	95	321	130	661
1888	527,533	12,159	....	5,070	66	187	125	331
1889	523,838	13,047	....	5,921	57	352	167	485
1890	520,466	14,293	....	6,319	104	577	99	535
1891	517,145	13,911	....	5,697	63	119	92	320
1892	513,818	12,671	....	5,322	47	181	111	456
1893	510,514	13,919	....	6,035	47	231	221	273
1894	507,230	12,073	64,544	5,214	65	232	248	299
1895	638,291	16,215	78,411	7,201	97	168	192	397
1896	632,512	14,617	....	....	157	227	206	306
1897	644,129	15,290	78,411	6,972	91	209	145	344
1898	668,645	15,380	....	6,489	123	145	148	283
1899	668,645	16,269	83,042	7,039	189	164	174	320
1900	668,645	16,393	83,042	6,417	143	113	120	150
1901	686,322	15,493	85,238	6,473	158	192	154	472
1902	710,337	15,392	85,885	6,378	222	318	190	334
1903	716,810	14,210	85,885	5,786	165	201	108	132
1904	723,430	15,851	88,475	7,826	181	149	82	696
1905	730,143	14,050	89,296	5,726	151	298	47	239
1906	739,180	15,001	90,382	6,686	148	188	79	576

7[illegible]4 | 13,676 | 91,25[illegible] | 530 | [illegible]7 | 132 | 80 | 256

Table XXVII. — Berlin, Germany. ✓

YEARS.	Population.	Total Deaths.[1]	Population of Children under 5 years of age.	Deaths of Children under 5 years of age.	Deaths from Diphtheria.	Deaths from Scarlatina.	Deaths from Typhoid Fever.	Deaths from Measles.
Beginning	1,089,070	....	142,476					
1880	....	32,823	....	19,249	1,198	872	527	376
End	1,123,749	....	183,060					
1881	....	31,055	....	17,483	1,593	903	352	201
End	1,158,539	....	143,828					
1882	....	30,465	....	16,990	1,914	604	357	144
End	1,196,205	....	146,138					
1883	....	35,056	....	19,902	2,651	867	222	1,173
End	1,232,716	....	144,464					
1884	....	32,932	....	18,440	2,446	395	243	295
End	1,271,677	....	144,620					
1885	....	31,483	....	15,558	1,816	409	214	406
End	1,315,656	....	146,227					
1886	....	34,293	....	19,215	1,535	271	181	565
End	1,363,031							
1887	....	30,336	....	15,777	1,305	257	193	223
End	1,415,269							
1888	....	29,298	....	15,076	1,018	201	188	364
End	1,472,151							
1889	....	34,460	....	18,394	1,189	244	290	201
End	1,528,721							
1890	[1]1,579,524	33,393	[2]164,370	17,630	1,492	298	143	441
End	[1]	....	[2]					
1891	1,601,327	....	....	16,800	1,010	150	166	130
1892	1,656,715	32,696	172,378	16,319	1,325	53	137	217
1893	1,714,938	36,032	....	....	1,578	582	161	341
1894	1,655,235	30,961	176,200	14,649	1,361	443	69	203
1895	1,677,304	33,627	164,258	16,034	934	817	95	175
1896	1,695,313	30,578	....	13,443	515	333	80	111
1897	1,758,885	30,622	58,339	13,825	507	217	71	161
1898	1,805,054	30,571	56,751	13,595	608	268	78	119
1899	1,817,952	34,011	166,888	14,878	609	525	74	530
1900	1,864,203	35,409	....	15,498	534	502	109	195
1901	1,891,900	34,091	....	14,839	469	492	88	174
1902	1,920,459	30,737	....	11,724	205	272	52	373
1903	1,955,875	31,879	....	12,254	218	331	63	341
1904	2,040,455	31,557	....	....	339	414	75	412
1905	2,006,850	34,450	178,573	13,240	370	428	....	418
1906	....	....	....	....	....	....	....	....

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[1] Census of December 1, 1890.

[2] Excluded: Still-born, 1,749, 1,771, 1,759, 1,707, 1,778, 1,848, 1,710, 1,761, 1,756, 1,789, 1,473 .

2,096,318 | 34,270 | 15344 | 10,833 | 464 | 179 | 75 | 393

16.35

REMOVAL OF BODIES.

During the year permits were given for the removal of 483 bodies, chiefly from one cemetery to another.

STILL-BIRTHS.

In living births a larger proportion of males than females is born each year. In still-births the proportion is vastly larger. The still-born males in the City of Boston for the year 1906 were in the ratio of 128 to 100 females. The appended table, XXVIII., shows that there has been a steady decreasing ratio of the still-births to the total births for a period of twenty years, except from 1900–06, inclusive.

Table XXVIII.—Still-births by Months with Percentages to Total Births and Ratio to 1,000 Inhabitants for Twenty Years.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.	*Total Number of Living Births.	Percentage to Total Births.	Ratio to 1,000 Inhabitants.
1887	45	54	40	48	36	44	34	57	37	43	48	48	534	12,137	4.21	1.33
1888	48	48	38	34	52	56	48	40	55	38	48	47	552	12,613	4.19	1.33
1889	43	51	49	54	61	59	46	50	46	51	44	44	598	12,787	4.47	1.42
1890	55	40	52	58	49	42	51	49	54	50	68	59	627	13,289	4.50	1.39
1891	46	47	58	48	55	51	56	49	40	50	57	57	614	13,957	4.21	1.33
1892	44	48	51	57	60	58	51	55	44	54	57	54	633	15,154	4.01	1.34
1893	54	49	52	59	42	41	51	57	51	38	50	61	605	14,602	3.98	1.24
1894	56	56	60	50	69	82	49	45	52	72	65	44	700	15,401	4.35	1.39
1895	38	47	52	62	41	58	56	63	50	39	51	50	607	15,613	3.74	1.21
1896	69	48	51	48	44	57	51	62	50	51	58	59	648	16,484	3.71	1.25
1897	52	55	61	55	62	43	42	46	58	52	40	48	614	16,973	3.49	1.16
1898	50	48	49	61	56	45	55	36	54	49	52	58	613	16,680	3.54	1.13
1899	46	60	41	43	46	52	41	43	35	37	56	39	539	16,247	3.21	.97
1900	51	36	63	53	47	41	49	46	42	57	41	47	573	16,420	3.39	1.02
1901	42	50	45	42	56	46	40	55	44	58	37	61	576	15,580	3.56	1.01
1902	51	50	45	66	37	59	39	66	55	42	50	63	623	15,549	3.85	1.08
1903	58	51	51	53	61	60	53	54	51	55	44	44	635	15,701	3.89	1.09
1904	57	53	62	50	66	60	52	65	54	49	46	49	663	16,211	3.93	1.13
1905	57	58	58	59	47	64	54	59	43	61	59	51	670	15,868	4.22	1.13
1906	42	66	51	50	61	61	71	54	49	62	49	42	658	16,000	4.11	1.09
Totals	1,004	1,015	1,029	1,050	1,048	1,079	989	1,051	964	1,006	1,020	1,025	12,282	303,266		
Average	50	51	51	52	52	54	49	53	48	50	51	51	614	15,163		

* Taken from the records of the City Register.

Table XXIX.—Cremations in the United States. 1876-1906, inclusive.

CREMATION.

For centuries the method of disposal of the dead was entombment and earth-burial. About a quarter of a century ago cremation of dead bodies was introduced, and this method is now gradually spreading among civilized nations, as will be seen by the following table.

In order to ascertain the annual increasing number of cremations, official inquiries were addressed to the superintendents of the different crematories in the United States and Europe.

CREMATORIES.	Date established.	1876 to 1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
New York City (U. S. Cremation Company)	1885	....	..	9	77	67	83	106	160	187	186	232	243	296	330	331	466	528	602	654	647	720	841	845	904
Buffalo, N. Y.	1885	....	....	1	8	17	16	23	30	38	27	30	31	41	28	44	40	43	67	50	60	55	74	64	68
Troy, N. Y.	1890	....	....	....	....	....	....	....	4	10	14	15	12	10	18	14	13	20	16	19	23	20	20	.....	.....
Swinburne Island, N. Y.	1889	....	....	....	....	....	....	....	2	....	60	28	8	1	1	3	3	4	2	3	3	2	3	3	.....
Waterville, N. Y.	1893	....	....	....	....	....	....	....	...	....	....	1	1	6	5	4	4	6	10	1	6	1	5	10	.....
St. Louis, Mo.	1888	....	....	....	....	....	21	20	42	60	64	72	87	96	86	118	109	123	142	135	136	165	190	159	202
Philadelphia, Pa.	1888	....	....	....	....	....	14	28	31	51	62	68	74	88	85	78	114	99	118	118	130	158	160	168	131
San Francisco, Cal. (Odd Fellows')	1895	....	...	....	....	...	....	....	....	....	....	....	....	66	101	214	260	347	547	666	614	695	898	951	799
Boston, Mass.	1893	....	....	....	....	....	....	....	....	....	....	1	87	88	135	160	167	235	188	171	217	225	211	227	238
Cincinnati, O.	1887	....	....	...	....	11	21	34	45	43	34	42	38	66	46	71	59	56	81	89	69	79	92	92	100
San Francisco, Cal. (Cypress Lawn)	1893	....	....	....	....	....	....	....	....	....	....	42	111	88	70	54	65	107	98	91	352	169	133	114	.....
Chicago, Ill.	1893	....	....	....	....	....	....	....	....	....	....	6	42	66	54	82	130	127	188	182	200	201	241	225	244

Los Angeles, Cal.	1887	....	....	....	....	7	5	12	17	29	41	37	38	37	37	34	58	52	52	66	.....	83	88	250	135
Detroit, Mich.	1887	....	....	....	....	3	10	14	24	21	33	47	22	31	29	44	51	58	31	56	53	61	62	57	.....
Pittsburg, Pa.	1886	....	....	....	14	9	11	8	9	18	14	13	10	13	14	16	23	19	31	24	20	19	24	21	30
Baltimore, Md.	1889	....	....	....	....	....	....	3	5	12	16	22	15	11	17	21	14	22	18	22	18	11	23	13	20
Lancaster, Pa.	1884	....	3	36	14	13	6	1	3	1	3	5	2	1	1	1	2	4	2	2	5	.....	1	.....	.....
Davenport, Ia.	1891	....	....	....	....	....	....	....	....	6	7	13	8	8	9	23	17	18	34	29	31	30	33	31	23
Milwaukee, Wis.	1895	....	....	....	....	....	....	....	....	....	....	....	....	.....	21	34	30	53	40	45	51	50	57	61	43
Washington, D.C.	1896	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	25	38	25	24	33	32	42	17	39	.....
Pasadena, Cal.	1895	....	....	....	....	....	....	....	....	....	....	....	....	4	14	13	24	31	26	46	53	51	52	57	74
Washington, Pa.	1876	25	18	1	1	....	....	....	....	....	....	....	....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....
St. Paul, Minn.	1897	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	2	11	32	17	20	20	15	14	21	40
Fort Wayne, Ind.	1895	....	....	....	....	....	....	....	....	....	....	....	....	.....	.....	5	1	3	4	4	6	2	5	6	3
Mt. Auburn, Mass. (Cambridge)	1900	....	....	....	....	....	....	....	...	....	....	....	...	.....	.....	.....	.....	.....	50	119	134	153	180	183	162
Totals	......	25	16	47	114	127	190	249	372	471	561	674	831	1,017	1,101	1,391	1,609	2,012	2,379	2,646	2,880	3,007	3,419	3,597	3,116

Table XXX. — Summary of Crematories and Cremations in Several European Cities.

	CREMATORIES.	1878 to 1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
Germany.	Gotha	215	76	95	110	95	128	111	162	162	153	139	132	147	188	179	200	189	218	234	276	301	870	445
	Heidelberg	...	...	...	...	...	...	...	3	57	50	79	91	96	105	125	151	146	104	164	146	155	127	86
	Hamburg	...	...	...	...	...	...	...	...	2	48	98	41	70	81	98	111	145	181	187	225	280	367	...
	Jena	...	...	...	...	...	...	...	...	...	...	...	...	...	...	21	46	47	81	91	123	198	215	183
	Offenbach	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	5	110	82	128	118	123	142	155
	Total	215	76	95	110	95	128	111	165	221	251	316	264	313	374	423	513	637	666	804	888	1,057	1,721	869
‡ England.	London (Woking)	...	3	10	13	28	46	54	99	104	101	125	150	137	173	240	240	301	273	275	*301	358	347	140
	Manchester	...	...	...	...	...	...	...	...	3	20	47	58	52	51	62	88	84	96	81	86	...	97	90
	Glasgow	...	...	...	...	...	...	...	...	...	...	...	1	10	16	12	16	20	18	20	24	20	35	45
	Liverpool	...	...	...	...	...	...	...	...	...	...	...	...	7	23	23	40	9	40	54	38	40	35	46
	Total	...	3	10	13	28	46	54	99	107	121	172	209	206	263	337	384	414	427	430	449	418	514	321
Sweden.	Stockholm	...	...	...	13	23	46	27	48	41	51	42	31	47	54	49	54	54	46	46	48	49	...	...
	Gottenberg	...	...	...	...	...	...	11	9	11	12	7	3	14	19	24	21	16	16	20	19	18	21	...
	Total	...	...	...	13	23	46	38	57	52	63	49	34	61	73	73	75	70	62	66	67	67	21	

France.	Paris	......	....	....	....	....	749	3,388	3,741	3,974	3,911	3,992	4,180	4,423	4,197	4,513	4,554	5,825	‡310	300	270	354	352	371
	Rouen	......	....	....	....	....	....	......	......	......	......	......	......	......	.....	.....	5	4	1	6	7	4	4	14
	Total	......	....	....	....	....	749	3,388	3,741	3,974	3,911	3,992	4,180	4,423	4,197	4,513	4,559	5,829	311	306	277	358	356	385
Switzerland.	Zurich	......	....	...	....	....	21	32	39	39	41	40	44	64	69	82	81	116	126	159	158	209	273	298
	Basil	......	....	....	....	....	....	......	......	......	......	......	.....	......	......	17	14	20	17	30	30	36	48	44
	Total	......	....	....	....	....	21	32	39	39	41	40	44	64	69	99	95	136	143	189	188	245	316	340
Denmark.	Copenhagen	......	....	....	....	....	....	......	......	......	4	12	18	21	14	18	28	28	34	44	51	47	73	....

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* Woking 140 and Golder's Green 298 (now called the London Cremation Co., Ltd.).

† The discrepancy is unexplainable.

‡ The Cremation Society of England (324 Regent St., London) has furnished the following information: Total number of cremations in Hull 102, Darlington 28, Leicester 42, Birmingham 68, Leeds 31, Bradford 14 and Sheffield 20.

Table XXXI. — Summary of Cremations in Italian Cities.

* CITIES.	Date of Inauguration.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
ITALY.																																
Milan	1876	2	9	14	25	40	70	67	44	61	70	61	55	76	85	72	65	66	74	72	64	65	104	92	99	92	107	107	92	89	122	107
Lodi	1877	...	6	2	2	5	5	2	2	2	1	4	1	3	3	3	3	1	3	....	1	....	....	....	....	1	....	....	....	....	....	....
Rome	1883	...	...	...	...	...	...	...	15	29	43	32	33	59	90	74	47	75	55	61	54	49	37	29	55	52	22	61	65	65	71	....
Cremona	"	...	...	...	...	...	...	...	4	15	5	25	9	10	10	5	8	4	3	4	7	3	3	2	3	6	3	1	4	4	3	3
Brescia	"	...	...	...	...	...	...	...	..5	2	2	5	4	3	2	2	4	1	1	3	2	1	3	3	3	2	1	3	....	3	5	6
Iadue	1884	...	...	...	...	...	...	...	...	4	5	5	4	7	5	6	4	3	8	3	3	4	2	3	4	....	....	....	...	....	....	....
Udine	"	...	...	...	...	...	...	...	...	2	4	5	....	4	2	3	2	6	2	2	2	1	1	3	2	6	2	....	7	6	4	2
Varese	"	...	...	...	...	...	...	...	...	1	1	1	5	....	5	...	1	2	1	....	1	3	3	2	2	....	....	...	....	....	....	....
Spezia	1885	...	...	...	...	...	...	...	...	....	1	2	....	....	....	....	....	...	...	....	....	....	....	....	....	....	5	....	3	....	....	....
Novara	"	...	...	...	...	...	...	...	...	....	1	2	2	1	3	1	....	7	1	3	1	1	1	2	4	....	....	....	....	....	....	....
Florence	"	...	...	...	...	...	...	...	...	....	14	16	26	18	21	20	16	24	18	19	24	11	14	13	14	17	20	20	24	18	33	....
Livorno	"	...	...	...	...	...	...	...	...	....	8	13	20	10	20	26	9	16	16	11	9	24	9	13	13	14	22	25	19	....	....	....
Asti	"	...	...	...	...	...	...	...	...	....	1	....	4	3	3	2	3	4	....	2	....	1	....	4	....	1	....	...	....	...	....	....
Pisa	"	...	...	...	...	...	...	...	...	....	8	3	1	3	2	8	1	7	6	7	3	1	2	2	6	10	4	13	13	8	16	20
Alexandria	1886	...	...	...	...	...	...	...	...	...	....	1	....	1	....	....	....	....	....	....	....	....	....	....	....	....	....	....	...	....	....	....
Como	"	...	...	...	...	...	...	...	...	....	....	5	2	2	3	1	2	2	2	....	1	1	3	2	1	1	....	1	1	....	....	....
Turin	1887	...	...	...	...	...	...	...	...	....	....	...	1	18	12	10	28	14	22	21	11	22	17	28	14	19	23	17	24	30	36	31

Mantua..........	"	...	...	...	...	...	...	...	...	....	....	....	1	1	2	1	3	4	8	3	4	....	3	2	4	1	5	4	3	8	....	..
St. Remo..........	1888	...	...	...	...	...	...	...	...	....	....	....	...	5	10	10	9	9	9	4	7	5	5	11	6	6	10	4	8	....	....	....
Verona..........	"	...	...	...	...	...	...	...	...	....	....	....	....	3	2	2	2	1	....	3	1	....	3	1	1	1	2	1	2	1	1	3
Bologna	1889	...	...	...	...	...	...	...	...	....	....	....	....	....	2	10	12	5	11	3	11	14	20	19	26	22	21	26	26	26	38	45
Modeno..........	1890	...	...	...	...	...	...	...	...	....	....	....	....	....	....	2	1	4	1	2	3	3	....	3	1	4	5	1	3	1	3	7
Venice..........	1891	...	...	...	...	...	...	...	...	....	....	....	....	....	....	....	1	7	5	5	5	3	7	4	4	2	7	3	8	8	....	....
Spoleto..........	1894	...	...	...	...	...	...	...	...	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	2	3
Perugia..........	1895	...	...	...	...	...	...	...	...	....	....	....	....	....	....	....	....	....	....	....	6	4	2	2	3	4	....	....	....	....	....	....
Sienna	"	...	...	...	...	...	...	...	...	....	....	....	....	....	....	....	....	....	....	....	....	3	2	1	....	....	....	2	3	2	3	1
Bera	1897	...	...	...	...	...	...	...	...	....	....	....	....	....	....	....	....	....	....	....	....	....	1	....	....	1	....	....	....	....	....	....
Total..........	....	2	15	16	27	45	75	69	70	116	164	180	168	227	282	258	221	262	246	228	220	219	242	241	265	262	259	289	305	179	337	228

* Lodovico Forresti Statistica delle, Cremazioni eseqtila in Europa Nel Sicolo XIX., 1876–1900. Edita a cura della Società di Cremazioni in Bologna.

Table XXXII.—Supplemental Summary of Crematories and Cremations in United States and Other Foreign Cities.

CREMATORIES.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.	1906.
Denver, Col.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	48	61	57
Oakland, Cal.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	160	311	352	456	557
Cleveland, Ohio	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	38	42	63	75	65	97
Montreal, B. P.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	5	17	19	19
Eisenach, Germany	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17	43	57	79	...
Karsruhe "	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	46	94	...
Mannheim "	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	20	42	52	74	110	...
Maintz "	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	90	156	194	219
Total	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	58	264	564	805	1,078	949

Table XXXIII.—Comparative Death-rates per 10,000 Inhabitants from Pulmonary Tuberculosis in some American and Foreign Cities for Ten Years, 1897-1906, inclusive.*

YEARS.	Boston, Mass.	Philadelphia, Pa.	New York, N. Y. (old city).	Chicago, Ill.	Brooklyn, N. Y. (old city).	St. Louis, Mo.	London, England.	Paris, France.	Berlin, Germany.	Vienna, Austria.	Glasgow, Scotland.	Liverpool, England.
1897	24.37	19.66	24.95	13.41	20.40	16.61	17.62	37.02	21.94	39.31	19.86	18.94
1898	22.90	20.88	25.08	14.64	21.86	16.07	17.68	38.43	20.99	35.40	19.38	18.08
1899	22.27	22.23	26.00	12.90	21.90	17.04	18.88	39.40	22.42	38.67	19.67	19.64
1900	25.08	21.00	25.69	15.30	20.90	17.49	17.50	40.10	24.52	38.46	19.08	19.25
1901	23.71	22.29	24.97	14.19	20.46	18.86	18.18	40.51	21.93	36.23	18.55	18.97
1902	21.70	21.07	22.57	14.04	18.78	18.21	16.64	42.55	20.41	34.40	16.72	18.93
1903	21.10	22.14	24.07	14.26	18.55	17.46	15.92	38.93	19.31	34.14	15.82	17.55
1904	21.76	22.06	24.66	16.20	19.73	19.39	16.55	38.36	19.95	31.44	16.17	17.72
1905	20.56	19.73	23.75	16.09	17.76	18.35	14.53	....	21.49	33.32	13.94	15.93
1906	19.67	21.77	23.94	15.73	16.07	18.52	14.78	37.58	....	....	15.50	15.84

* The death-rates were calculated on the official figures sent from the above cities.

Table of Nuisances Abated.

1906.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
House drains repaired..	120	65	84	74	188	86	87	68	79	50	55	94	1,050
Vaults cleaned...........	6	3	3	2	8	7	8	8	23	7	7	3	85
Traps supplied..........	4	10	11	19	13	13	15	18	14	27	15	13	172
Yards cleaned............	55	85	68	1,115	164	105	185	137	78	75	55	62	2,184
Cellars cleaned..........	110	59	84	140	96	107	132	85	57	58	48	65	1,044
Cesspools cleaned.......	10	7	6	13	28	25	16	4	4	20	5	1	139
Water-closets cleaned and repaired...........	130	143	112	84	95	90	89	68	77	88	64	148	1,188
Supply pipes repaired...	30	21	30	13	16	15	1	6	1	2	4	10	149
General cleaning and repairing.................	51	51	40	58	39	64	18	10	7	7	12	13	370
Dark rooms corrected...	19	18	5	3	9	3	4	....	....	....	1	9	71
Dark and unventilated water-closets remedied	34	40	26	27	45	18	8	5	17	28	32	28	308
Exposed manure removed.................	3	2	1	1	5	3	5	1	....	3	22	1	47
Passageways cleaned...	16	19	18	274	45	49	61	34	22	31	23	14	606
Sheds cleaned.	4	4	5	27	7	...	11	3	5	5	....	1	72
Tenements whitewashed	20	30	38	78	46	70	51	26	31	35	34	83	492
Stables cleaned..........	1	3	2	3	3	....	.....	2	....	....	8	1	23
Sundry nuisances abated	9	13	14	9	30	40	65	47	66	62	58	77	490
Rain conductors repaired.................	1	3	10	11	8	6	10	8	3	5	6	7	77
Roofs repaired..........	1	4	5	9	7	8	3	5	4	9	4	8	67
Receptacles provided for garbage................	33	26	52	407	35	50	85	54	43	23	34	38	880
Filthy and uncovered garbage receptacles remedied	16	17	24	142	49	97	131	84	24	45	22	20	671
Vacant lots from which stagnant water was removed...............	....	1	1	9	8	3	30	22	3	3	2	1	83
Vacant lots cleaned	2	7	6	60	23	15	26	23	7	14	4	1	188
Overcrowed rooms relieved	11	4	3	1	3	3	2	4	2	2	2	3	40
Gas pipes repaired......	53	18	40	48	44	36	23	17	17	19	21	9	345
Ice cream................	....	....	....	.....	.....	....	.....	59	308	115	23	1	506
Total................	739	653	688	2,627	1,014	913	1,066	798	892	733	561	661	10,840

MANUFACTURE AND SALE OF ICE CREAM.

Owing to the frequent and sometimes alarming illnesses immediately following the eating of ice cream, the Board of Health became convinced that this article of food should be better protected in its manufacture and subsequent care, and promulgated the following regulation on August 4, 1906:

REGULATION FOR THE MANUFACTURE, SALE AND CARE OF ICE CREAM.

Article I.

SECTION 1. No ice cream shall be manufactured or stored in any portion of a building which is used for the stabling of horses, or other animals, or in any room used in whole or in part for domestic or sleeping purposes, unless the manufacturing and storage room for ice cream is separated from other parts of the building to the satisfaction of the Board of Health.

SECT. 2. All rooms in which ice cream is manufactured or stored shall be provided with tight walls and floors and kept constantly clean. The walls and floors of said rooms shall be of such construction as to permit rapid and thorough cleansing. The room or rooms aforesaid shall be equipped with appliances for washing or sterilizing all utensils employed in the mixing, freezing, storage, sale or distribution of ice cream, and all such utensils after use shall be thoroughly washed with boiling water or sterilized by steam. Vessels used in the manufacture and sale of ice cream shall not be employed as containers for other substances than ice cream.

SECT. 3. All establishments in which ice cream is manufactured shall be equipped with facilities for the proper cleansing of the hands of operatives, and all persons immediately before engaging in the mixing of the ingredients entering into the composition of ice cream, or its subsequent freezing and handling, shall thoroughly wash his or her hands and keep them cleanly during such manufacture and handling. All persons shall be dressed in clean outer garments while engaged in the manufacture and handling of ice cream.

SECT. 4. No urinal, water closet or privy shall be located in the rooms mentioned in the preceding section, or so situated as to pollute the atmosphere of said rooms.

SECT. 5 All vehicles used in the conveyance of ice cream for sale or distribution shall be kept in a cleanly condition and free from offensive odors.

Article II.

SECTION 1. Ice cream kept for sale in any shop, restaurant or other establishment, shall be stored in a covered box or refrigerator. Such box or refrigerator shall be properly drained and cared for, and shall be kept tightly closed, except during such intervals as are necessary for the introduction or removal of ice cream or ice, and they shall be kept only in such locations and under such conditions as shall be approved by the Board of Health.

Article III.

SECTION 1. Every person engaged in the manufacture, storage, transportation, sale or distribution of ice cream, immediately on the occurrence of any case or cases of infectious disease, either in himself or in his family, or amongst his employees, or within the building or premises where ice cream is manufactured, stored, sold or distributed, shall notify the Boston Board of Health and at the same time shall suspend the sale and distribution of ice cream until authorized to resume the same by the said Board of Health. No vessels which have been handled by persons suffering from such disease shall be used to hold or convey ice cream until they have been thoroughly sterilized.

Article IV.

SECTION 1. All cream, milk or skimmed milk, employed in the manufacture of ice cream, shall before use be kept at a temperature not higher than fifty degrees Fahrenheit.

SECT. 2. No person, by himself or by his servant, or agent, or as the servant or agent of any other person, firm or corporation, shall, in the City of Boston, sell, exchange or deliver any ice cream which contains more than 500,000 bacteria per cubic centimeter.

SECT. 3. No old or melted ice cream, or ice cream returned to a manufacturer from whatever cause, shall again be used in the preparation of ice cream.

CONTAGIOUS DISEASES.

SMALLPOX.

The highest death rate from this disease in each ten thousand inhabitants in Boston occurred in 1873, when it amounted to 27.77.

From 1870 to 1875 the death rate averaged . . .	7.05
From 1840 to 1870 the death rate averaged annually .	3.85
From 1875 to 1905 the death rate averaged annually .	.22

There was no death in 1906.

DIPHTHERIA.

Diphtheria, though always present in the city, has not prevailed unusually during the past year, and the percentage of deaths to the number of cases reported is now, as it has been for many years, less than one-third of what it was before the use of antitoxin.

The average annual death rate from diphtheria to each ten thousand of the population for ten years, ending 1905, was 548. The rate for 1906 was 252.

SCARLET FEVER.

Scarlet fever showed no unusual prevalence during the year until January 9, 1907, when a striking increase of the disease appeared.

Two hundred ninety-eight cases were reported during the first week of the onset, and a total of 519 cases for the month. This sharp outbreak of scarlet fever appeared at the same time in Cambridge, Somerville and other nearby places. The capacity of the City Hospital to receive scarlet fever patients was exhausted within the first forty-eight hours after the outbreak occurred, and the Board of Health felt called upon to seek such accommodations elsewhere as could be found available. It was able to secure care for twenty cases in the Brookline hospital. The Board then hastily prepared and converted three of its own hospitals (used for other infectious diseases) to the temporary use of scarlet fever patients, and closed the fiscal year, January 31, 1907, with 121 cases of this disease in the care of the Health Department. The average annual death rate from scarlet fever for each ten thousand of the population for ten years, 1896–1905, was 178. The rate for 1906 was 0.65.

The appearance of this recent outbreak became extremely suggestive of a common cause to be found in the milk supply, and an investigation was therefore at once instituted.

CONSUMPTION.

The death rate from consumption in Boston has steadily decreased for many years, and particularly so during the last twenty years, notwithstanding our serious lack of hospital accommodations. Our highest recorded death rate from this disease in Boston occurred in 1853, when it amounted to 48.16 in each ten thousand of the population, and the average annual death rate in each ten thousand of the population from this disease from 1850 to 1855 was 47.36.

The average death rate from 1880 to 1885 was .	40.91
The average death rate from 1885 to 1890 was .	35.44
The average death rate from 1890 to 1895 was .	28.88
The average death rate from 1895 to 1900 was .	24.05
The average death rate from 1900 to 1905 was .	21.75
and the death rate for 1906, was	19.67

TYPHOID FEVER.

The highest death rate from typhoid fever in Boston in each ten thousand of the population occurred in 1872, when it amounted to 8.62.

The average from 1870 to 1875 was	7.09
The average from 1875 to 1880 was	3.92
The average from 1880 to 1885 was	5.19
The average from 1885 to 1890 was	3.91
The average from 1890 to 1895 was	3.11
The average from 1895 to 1900 was	3.06
The average from 1900 to 1905 was	2.44
The rate for 1906 was	2.02

MEASLES.

The highest death rate per ten thousand of the inhabitants in Boston occurred in 1849, when it amounted to 15.83, and for the period between 1845 and 1850 it was 7.29.

From 1880 to 1885 it was	2.01
From 1885 to 1890 it was	1.17
From 1890 to 1895 it was	.39
From 1895 to 1900 it was	.72
From 1900 to 1905 it was	1.24
The rate for 1906 was	1.01

TYPHUS FEVER.

No death has occurred in Boston from this disease since 1888.

CHOLERA.

No death from cholera has occurred in Boston since 1871.

YELLOW FEVER.

But one death has occurred in Boston from this disease since 1885, and that occurred in 1898.

RABIES.

This disease has prevailed to a larger extent in Massachusetts during the last two years than usual. Boston had been comparatively exempt until 1906, when 48 cases occurred, and during November and December, 1906, 29 cases were found, causing the Board of Health to feel that some action should be taken.

The authority to institute preventive measures against this disease being vested in the Mayor and Board of Aldermen, the Board of Health felt called upon to address his Honor the Mayor and the Board of Aldermen in the following communication:

HEALTH DEPARTMENT,
OLD COURT HOUSE, BOSTON, December 28, 1906.

HON. JOHN F. FITZGERALD,
Mayor of Boston:

DEAR SIR, — The Board of Health respectfully calls his Honor's attention to the fact that the disease known as "rabies" has been prevalent among dogs throughout the state of Massachusetts for more than two years, with several fatal results among people who have been bitten by such dogs. Boston, however, has been comparatively free from this disease among dogs for a long time, until the present year, during which there have been found forty-eight dogs affected by said disease; during this time six inhabitants of Boston have been sent to the City Hospital, having been bitten by rabid animals, and successfully treated with Pasteur serum.

During November and the present month we have found twenty-nine cases of rabies among dogs in Boston. Under the present conditions the Board of Health respectfully recommends that suitable and early action be taken, under section 158, chapter 102, of the Revised Laws, requiring that for a period of three months, at least, all dogs in Boston be properly and securely muzzled or restrained from running at large, and that a suitable person or persons be authorized to kill any dog found unmuzzled and running at large, contrary to the order of the Mayor and Aldermen.

Very truly yours,

SAMUEL H. DURGIN,
Chairman.

SCHOOL-HOUSES AND SCHOOL CHILDREN.

Many changes have taken place in recent years for the sanitary improvement of our school-houses and the physical welfare of the school children. This has been accomplished in part by the better construction and care of the school-houses and their appurtenances, and in part by a closer observation and inspection of the school children by teachers and physicians. The old privy vaults have by several successive gradations given way to modern indoor conveniences of much higher grade. Cesspools have been replaced by direct sewer connections; light and well-ventilated basements useful for playrooms in bad weather have taken the place of the former dark and unventilated basements. The fresh air for the school-rooms, instead of being wholly dependent upon the caprices of the weather and unaided air shafts in the walls, frequently terminating in the attic, is now secured by well constructed air shafts, provided with the necessary power to make them effective.

The proper seating of children has been largely secured by the action of the medical profession and the School Committee. But while the school-house conditions have been greatly improved there is still much to be looked for. Some of our school-houses should be abandoned, and extensive alterations should be made in others. Additional houses are needed, and a more liberal allotment of grounds should be given to many already in use.

We have at the present time a Board of Schoolhouse Commissioners with ample scientific qualifications, valuable experience, and the needful activity. We believe that under these conditions the best school-house work is likely to be advanced as fast as the means may be provided therefor.

The particular attention now given to the physical condition of the school children was begun in 1894. This has consisted in daily visits made by the medical agents of the Board of Health, who examine such children as are selected by the teachers as needing the observation and advice of a physician. Diagnoses are made, cases of infectious diseases sent home, and the teacher advised as to what should be done with the other children who are ill. Examinations for evidence of vaccination and other special inspections for pediculosis, etc., are made from time to time. The medical agents receive from the Board of Health office daily bulletins of all infectious diseases reported, and said agents have to do with the isolation and release from isolation of the cases which occur in their several districts, and the return of all children to school after exposure to infectious disease.

This work is not all that was contemplated and provided for between 1890 and 1894, when our school inspection was planned. It has served to stimulate and warrant other cities in this country to adopt it, and to extend its usefulness far beyond that reached in our own city. Its highest compliment was given a year ago by our State, whose Legislature then made the work compulsory throughout the Commonwealth. The requirements under said act of the Legislature embrace some new work, including much that was contemplated in our original plan. The sight and hearing of every child in school is to be tested once in each school year by the teachers, and once a year by the school physicians for any other defect which may interfere with his school work. The Board of Health has also added to the former duties of the medical inspectors of schools that of ascertaining the condition, isolation, and means for prevention in all cases of typhoid fever and consumption. The extent of this medical service in the schools is dependent principally upon the observation and care used by the teachers in detecting and reporting all cases of illness and defects among the children to the visiting physician. The best results from the medical inspectors' work in the schools will be obtained only when nurses are employed to aid the teacher in finding sick and the school physician in securing their treatment in the home and in the dispensary. The Board is gratified to see that the services of nurses are fairly assured.

The following is a list of the diseases found in the schools during the year 1905:

I. — SPECIFIC INFECTIOUS DISEASES.

Diphtheria	13
Scarlet fever	13
Measles	70
Whooping-cough	134
Mumps	59
Chicken-pox	47
Influenza	58
Syphilis	4
Tuberculosis	6
Erysipelas	2
Malaria	2

II. — DISEASES OF THE ORAL AND RESPIRATORY TRACT.

1. *Mouth.*

Stomatitis :	
(*a*) Simple (erythematous),	2
(*b*) Ephthous herpetic	2
(*c*) Ulceration	1
Alveolar abscess	25

2. *Pharynx.*

Acute pharyngitis	141
Hypertrophic pharyngitis (acute and chronic)	73

3. *Tonsils.*

Acute follicular tonsilitis	461
Hypertrophic tonsilitis	452
Abscess	3

4. *Uvula.*

Elongation	5

5. *Nose.*

Acute rhinitis	79
Chronic rhinitis	2
Purulent rhinitis	1
Ozaena	5
Epistaxis	14
Deviations of septum	2

6. *Naso Pharynx.*

Naso-pharyngitis (post-nasal catarrh)	34
Adenoid disease	425

7. *Larynx.*

Acute laryngitis	41
Chronic laryngitis	19

8. *Bronchi.*

Acute bronchitis	131
Chronic bronchitis	14

III. — DISEASES OF THE EAR.

Foreign bodies (cerumen, etc.)	1
Otitis media catarrhal, acute and chronic	67
Otitis media, suppurative, acute and chronic	50
Mastoiditis	2
Imperfect hearing (without visible cause)	93

IV. — DISEASES OF THE EYE.

1. Foreign bodies	20

2. *Eyelids.*

Blepharitis	158
Stye	63
Ptosis	2
Trichiasis	5

3. *Lachrymal Organs.*

Abscess	1
Obstruction of duct	3

4. *Conjunctiva.*

Conjunctivitis:	
(*a*) Acute catarrhal	250
(*b*) Purulent	15
(*c*) Phlyctenular	9
(*d*) Granular	30

5. *Cornea.*

Interstitial keratitis	9
Ulcer	10
Opacity	10

6. *Iris.*

Iritis	1
Synachiæ	1

7. *Muscles.*

Strabismus	43
Nystagmus	2
Imperfect sight (without visible cause)	440

V. — DISEASES OF THE SKIN.

Acne	53
Alopecia areata	9
Dermatitis	48
Eczema	442
Erythema multiforme	1
Erythema simplex	32
Furunculus	36
Herpes simplex	303
Herpes zoster	3
Impetigo contagiosa	457
Pediculosis	2,412
Pemphigus	9
Pruritus	49
Psoriasis	19
Scabies	377
Seborrhœa	37
Tinea favosa	3
Tinea tricophytina	145
Tinea versicolor	1
Urticaria	35
Verruca	26

VI. — MISCELLANEOUS DISEASES.

Anæmia	208
Debility	214
Headache	92
Cervical adenitis	101
Chorea	35
Ulcer	31
Deformities (spinal and extremities)	17
Sprains	21
Contusions	53
Wounds	183
Abscess	54
Dental caries	84
Neuralgia	24
Epilepsy	12
Rheumatism	12
Cardiac diseases	42
Gastric diseases	51
Intestinal diseases	45
Urinary diseases	13
Vaccinations (performed)	541
Certificates of vaccination	1,847
Unclassified	73

SUMMARY.

Specific infectious diseases	408
Oral and respiratory diseases	1,932
Diseases of the ear	213
Diseases of the eye	1,067
Diseases of the skin	4,497
Miscellaneous diseases	3,753
Found free from disease	*9,241
Total	21,111

Number of pupils examined in the schools	21,111
Number recommended to be sent home	3,417
Number consultations with teachers (about pupils returning to school, etc.)	2,714

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* An unusual number of pupils were examined for pediculosis, vaccination and dental caries.

MEDICAL INSPECTORS OF SCHOOLS.

District.	NAME.	Address.	Telephone.
36	Ames, John L.	72 Chestnut street, City	Hay. 1188.
29	Ascher, Joseph	385 Hanover street, City	Rich. 1934-4.
40	Ayer, S. H.	318 Shawmut avenue, City	Tremont 663.
37	Badger, G. S. C.	485 Beacon street, City	Back Bay 1128.
66	Bailey, F. J.	338 Bowdoin street, Dor	Dor. 328-4.
19	Bancroft, W. B.	597 Broadway, S. B.	S. B. 472-2.
3	Bishop, F. L.	401 Saratoga street, E. B.	E. B. 353-3.
43	Blakely, D. N.	255 Warren street, Rox	Rox. 628.
33	Boardman, W. S.	63 Mt. Vernon street, City	Hay. 2184.
75	Broidrick, J. P.	777 Centre street, J. P.	Jam. 268-2.
41	Brownrigg, J. S.	16 Delle avenue, Rox	Rox. 258.
59	Butler, J. E.	64 Monadnock street, Dor	Dor. 1391-3.
47	Butler, P. F.	567 Dudley street, Rox	Rox. 430.
28	Ceconi, John A.	11 Parmenter street, City	Rich. 1967-4
79	Coffin, A. B.	10 Rosedale street, Dor	Dor. 34-3.
39	Cogan, Joseph A.	419 Boylston street, City	Back Bay 2350.
21	Cole, R. M.	456 Broadway, S. B.	S. B. 464-2.
63	Connolly, J. M.	183 Harvard street, Dor	Dor. 1095.
65	Costello, John H.	31 Savin Hill avenue, Dor	Dor. 748-1.
32	Coues, W. P.	261 Beacon street, City	Back Bay2192-1.
53	Cronin, M. J.	5 Elm Hill avenue, Rox	Rox. 15.
77	Curran, Simon F.	102 Norfolk street, Dor	Dor. 449-2
55	Cutler, J. T.	20 Crawford street, Rox	Rox. 1246-3.
9	Dearborn, J. G.	2 Wood street, C. D.	C. D. 414.
22	Denning, E. J.	216 W. Broadway, S. B.	S. B. 212-3.
45	Dowling, John J.	652 Mass. avenue, City	Tremont 38.
60	Eldridge, D. G.	15 Monadnock street, Dor	Dor. 341.
58	Emmons, Henry M.	428 Centre street, J. P.	Jam. 356-3.
6	Ensworth, W. H.	40 Princeton street, E. B.	E. B. 219-2.
42	Erb, T. C.	159 St. Botolph street, City	Back Bay 1607.
44	Fairbanks, A. W.	591 Beacon street, City	Back Bay 1434.
62	Fuller, W. T.	36 Harvard street, Dor	Dor. 314-1
11	Gallagher, J. T.	172 Bunker Hill street, C. D.	C. D. 472-1.
64	Giblin, F. J.	33 Adams street, Dor	Dor. 319.
4	Grainger, William H.	408 Meridian street, E. B.	E. B. 36.
69	Graves, Benjamin A.	178 Bowdoin street, Dor	Dor. 1315-2.
71	Greene, J. S.	1107 Washington street, Dor.	Mil. 58-2.

MEDICAL INSPECTORS OF SCHOOLS.— *Continued.*

District.	NAME.	Address.	Telephone.
48	Greene, William H	322 Warren street, Rox	Rox. 47.
56	Harrison, Henry	153 Huntington avenue, City	Back Bay 3501-1.
50	Hayes, D. P	157 Dorchester street, S. B	S. B. 482-3.
2	Hickey, John A	144 Saratoga street, E. B	E. B. 456.
73	Howell, W. W	1923 Centre street, W. R	Jam. 616-3.
76	Jillson, F. C	11 Hastings street, W. R	Jam. 270.
23	Keenan, H. J	254 W. Broadway, S. B	S. B. 362-2.
68	Kelley, J. H. H	7 Dracut street, Dor	Dor. 1310.
34	Kelly, William D	57 Hancock street, City	Hay. 606-3
74	Leard, J. S. H	392 Arborway, J. P	Jam. 271.
80	Linenthal, Harry	321 Blue Hill avenue, Rox	Rox. 881-7
10	Lyons, J. B	1 Dexter row, C. D	C. D. 325.
8	Magurn, Francis	112 Main street, C. D	C. D. 278-4.
13	Marion, H. E	5 Sparhawk street, B. D	Bri. 45-2.
15	McCauley, A. A	3 Mapleton street, B. D	Bri. 194-3.
14	McKeen, S. F	556 Cambridge street, Allston.	Bri. 4.
7	McNally, W. J	31 Monument square, C. D	C. D. 537-2.
61	Merrick, R. M	15 Adams street, Dor	Dor. 963.
27	Moore, John H	419 Boylston street, City	Back Bay 2350.
18	Morris, G. P	702 Broadway, S. B	S. B. 201-4.
49	Murphy, T. J	372 Dudley street, Rox	Rox. 570.
12	O'Brien, J. F	401 Bunker Hill street, C. D	C. D. 200.
70	O'Brien, J. J	2209 Dorchester avenue, Dor.	Mil. 356-2.
72	O'Brien, W. J. L	14½ Hyde Park avenue, Ros	Jam. 538-3.
5	O'Shea, E. F	5 Chelsea street, E. B	E. B. 259-3.
78	Parker, W. H	1773 Dorchester avenue, Dor	Dor. 77-2.
46	Perry, Henry J	636 Beacon street, City	Back Bay 996.
54	Pigeon, J. C. D	27 Elm Hill avenue, Dor	Rox. 1236-2.
1	Plummer, H. L	728 Saratoga street, E. B	E. B. 398.
67	Reilly, James A	1479 Dorchester avenue, Dor	Dor. 761-1.
17	Rice, Frederick W	16 Elko street, Bri	Bri. 57.
16	Rowen, H. S	30 Bennett street, B. D	Bri. 73.
25	Sheehan, W. J	197 W. Broadway, S. B	S. B. 443-3.
20	Sherman, J. H	534 Broadway, S. B	S. B. 228-2.
52	Sleeper, F. W	748 Dudley street, Dor	Dor. 637-2.
35	Smith, C. Morton	437 Marlboro street, City	Back Bay 781.
31	Smithwick, M. P	2 Arlington street, City	Back Bay 557.
26	Stuart, F. W	550 Broadway, S. B	S. B. 210.

MEDICAL INSPECTORS OF SCHOOLS.—*Concluded.*

District.	NAME.	Address.	Telephone.
38	Sullivan, John T	129 Beacon street, City	Back Bay2509-5.
80	Temple, W. F	240 Huntington avenue, City	Back Bay 622.
51	Watts, H. F. R	6 Monadnock street, Dor	Dor. 1162-1.
24	Weller, F. J	580 Broadway, S. B	S. B. 270.
57	Williams, C. E	31 Centre street, Rox	Rox. 1629-2.

FORT HILL WHARF.

A complaint was addressed to the Board of Health in July by parties doing business on Atlantic avenue, between Foster's wharf and Fort Point channel, of offensive odors said to arise from the loading of garbage and other refuse material upon scows at Fort Hill wharf. A hearing was given to the petitioners, and as the Board of Health had no authority to act in the premises its findings were referred to His Honor the Mayor in the following communication:

BOSTON, August 3, 1906.

HON. JOHN F. FITZGERALD,
Mayor of Boston:

DEAR SIR,—The Board of Health respectfully informs His Honor the Mayor that it has been called upon by representatives of the business concerns in the vicinity of Fort Hill wharf to abate a nuisance alleged to exist on said wharf. The petitioners have been heard, and the subject fully examined by the Board of Health. The complaints are well founded and deserve immediate attention.

The wharf is owned and used by the city for dumping garbage and other city wastes upon scows for removal from the city. That part of the present use of the wharf which relates to the dumping of general refuse from the end of the wharf into the Barney dumping boats for shipment to sea, was instituted by the Board of Health in 1886 as a temporary expedient to relieve the city of numerous nuisances made by the promiscuous dumping of this material into the docks and on vacant lots. This property and work were transferred to the Street Department in 1888.

The other use of the wharf, consisting of dumping kitchen garbage into a scow, under the wharf, belonging to and used by The New England Sanitary Product Company between this wharf and Spectacle Island, was instituted eight years ago by the Street Department. Both of said uses are very offensive.

Complaints by people doing business in the neighborhood of this wharf were made some years ago, heard by the Board of Health, and recommendations made to the Street Department, and carried out with more or less temporary relief at that time. The Board of Health has not for many years regarded this method of disposal as one which ought to be continued. There is no doubt about the present use of the wharf constituting a public nuisance.

The Board of Health respectfully brings the subject to the attention of His Honor the Mayor, with the recommendation that the city institute such immediate changes to mitigate the offence as the city may be able to secure, with a view to more radical relief in due time. The Board of Health will be pleased to furnish such further information and aid as His Honor the Mayor may require.

Very truly yours,

SAMUEL H. DURGIN,
Chairman.

STONY BROOK.

For many years Stony brook has been the unfortunate receptacle for the sewage and general drainage of a small community along its borders in the South End and Roxbury districts. More or less difficulties have stood in the way of constructing a sewer in the streets of these sections where sewers are needed to receive the sewage which now flows into Stony brook. The annoyance and expense, however, incident to the outlay in constructing these sewers and thus preventing the Charles river and Fenway nuisances, will undoubtedly exceed the outlay which would have been necessary for their prevention.

Stony brook discharges into the Charles river at the foot of Charlesgate East, and the sewage from this brook has accumulated on the flats immediately back of the Beacon-street houses, particularly between the outlet of the brook and Harvard bridge. The odors from this place at low tide were extremely offensive during the summer, and were most bitterly complained of by residents in that vicinity. The Board of Health attempted to subdue these odors by the use of chemical deodorants on the flats, but found that the enormous quantities of material made necessary and the limited effect produced made such measures inexpedient. The proper remedy for the evil being an engineering question for the city, the following communication was addressed to His Honor the Mayor:

BOSTON, September 17, 1906.

HON. JOHN F. FITZGERALD,
Mayor of Boston:

DEAR SIR, — The Board of Health respectfully calls the attention of His Honor the Mayor to a serious public nuisance under the control of the city, and begs to suggest a remedy.

The nuisance is situated on the flats in the rear of Beacon street, between Massachusetts avenue and Charlesgate East. It consists of sewage now being lodged there by Stony brook and exposed at low tide. This deposit has been taking place since last December, is accumulating rapidly, has been extremely offensive all summer, persistently complained of, and, if allowed to go on accumulating, will be very much worse another year.

Prior to last December the sewage carried by Stony brook was lodged in the Fenway waters, where it became an unbearable offence, and was removed at great expense. The outlet of the brook was then extended by couduit to its present terminus in Charles river. It is now to be extended by a conduit through Back street and along the margin of the river to a point near the North Station, below the proposed Charles-river dam. This work will require at least eighteen months to two years, and when completed the brook will at once begin its third and culminating deposit of sewage in comparatively still water, below the dam, in an active and congested section of the city, with a promise of further trouble and expense to the city.

We respectfully suggest that the quickest and least expensive method, and that which will secure the best results, will be found in providing city sewers to take the sewage which now enters Stony brook from Rogers avenue, Rogers court, Bay View and Downing, Vernon and Whittier streets, into the intercepting sewer, to be delivered at Moon Head. This would relieve Stony brook of the greater part of its pollution, and the remainder will soon be cut off by the action of the Board of Health and Sewer Department, and the future condition of Stony brook might be protected.

It has already cost the city $150,000 to remove the sewage which was deposited by Stony brook in the Fenway. The cost of removing the second and third accumulations — the second already demanding attention, and the third in contemplation — cannot be stated.

We also beg to recommend that inasmuch as this is an engineering question with more or less difficulties to overcome in Rogers avenue, and considering the urgency of the case, that the engineers of the Sewer Department be authorized to present plans and estimates with reasonable haste, and that the work of construction be finished before another warm season comes.

Very respectfully,

THE BOARD OF HEALTH,
By SAMUEL H. DURGIN, *Chairman.*

DUMPING GROUNDS.

A large portion of our city wastes, consisting of mixed ashes and house dirt, soiled paper, rags, bedding and general rubbish, and more or less decomposing matter, is still used for raising the grade of low lands and vacant lots and making new streets. This method of disposal is crude, noisome to those residing in the vicinity of the dumping grounds, and is the cause of many persistent complaints. The Board of Health in its efforts to minimize the nuisance occasioned by a careless use of these dumps, is frequently obliged to withdraw permits which have been issued to parties requiring them. The Board issues a copy of the ordinances and regulations of the Board of Health with each permit as follows:

[Extract from the City Ordinances.]

"Chapter forty-seven of the Revised Ordinances of 1898 is hereby amended by adding at the end of section eighteen the following words: 'and no person shall deposit or dump any house-dirt, house-offal, or other refuse matter, except in a place approved by the Board of Health.'"

The following regulation was passed by the Board of Health June 3, 1903:

Whereas, in the opinion of the Board of Health of the City of Boston, the burning in the open air of refuse, rubbish, and waste material of any description within the city limits is attended with noisome odors and dense smoke; and

Whereas, said odors and smoke are, in the opinion of said Board, liable to cause sickness among the inhabitants of said city;

Ordered, That from and after this date no person shall burn, or permit to be burned, in the open air, any refuse, rubbish or waste material of any description within the city limits on any land owned by him except in accordance with a written permit from the Board of Health.

[Chap. 185.]

An Act relative to the public health in the city of Boston.

Be it enacted, etc., as follows :

Section 1. Whenever the owners of unoccupied lands in the city of Boston, or of estates situated on a private passageway therein, neglect for one week after being notified by the board of health of said city, to clean and put in healthful condition such lands or passageway, said board may, at the expense of such owners, enter upon and clean and put in good condition such lands or passageway.

Sect. 2. Any expense occasioned by the doing of the work aforesaid upon any unoccupied lands shall be paid by the owners of such lands, and by the doing of the work on a passageway shall be paid by the owners of the estates abutting upon such passageway, in proportion to the number of linear feet thereof so abutting, and shall be a lien upon such estates from the time of the passage of the order aforesaid until the same is paid, and may be included and made a part of the taxes of such estate, and be collected in the same manner and with and as a part of such other taxes.

SECT. 3. This act shall take effect upon its passage. [*Approved March 19, 1897.*

The Board is still of the opinion that small crematories, situated in convenient sections of the city for the ready and complete treatment of this material, would give the most satisfactory results in all aspects of the subject.

REMOVAL OF BUILDINGS.

Acting under chapter 222, Acts of 1899, amended in chapter 219, Acts of 1897, the Board of Health, after due examination of premises and notice to owners, caused the removal of 125 buildings, which were either decayed beyond repair, or were unfavorably affecting the sanitary condition of other buildings.

The following is a list of the streets where this work has been done during the year:

Emerald street	Ward 9	Park street	Ward 5
Hingham street	Ward 9	Chelsea street	Ward 5
Village street	Ward 9	Norwich street	Ward 9
Compton street	Ward 9	Meander street	Ward 9
Davis street	Ward 9	Malden street	Ward 9
Middlesex street	Ward 9	Phillips street	Ward 11
Harrison avenue	Ward 9	West Cedar street	Ward 11
Dover street	Ward 9	Adams place	Ward 8
Hamburg street	Ward 9	Cambridge street	Ward 8
East Dedham street	Ward 9	Fayette street	Ward 10
Canton street	Ward 9	Bay street	Ward 10

PAVING AND DRAINING ALLEYWAYS.

The following is a list of the alleyways and places which have been paved and drained during the year by order of the Board of Health at the expense of the abutters:

Joiner street, Charlestown.

Briggs place.

Rear Columbus avenue, between Berwick park and West Newton street.

Rear 27, 29 and 31 Phillips street.

SMOKE ABATEMENT.

The Board of Health has had charge of the enforcement of the new smoke law for thirteen months, ending January 31, 1907. During this time observations have been taken, records made and conferences held with the representatives of 410 different premises, from which smoke had been found issuing contrary to the provisions of the smoke law of 1905. In many cases immediate compliance with the law has been possible; in many more it has been necessary to make constructive alterations in the plants. In some instances the changes made have proved disappointing, and further changes have been required. In nearly all cases the business representatives have manifested a desire and spirit to comply with the law and have diligently striven to do so, and while they have continued to exercise reasonable and honest efforts, with the amount of smoke constantly diminishing, the Board of Health has deemed it good judgment to confine the prosecutions to those who manifested indifference to its notices. There have been but two cases brought to court. The amount of "dark smoke or dense gray smoke" from premises which are covered by the law has already diminished not less than 75 per cent. There is no reason to doubt that this improvement will continue. An effort to include "locomotive engines and plants furnishing power for public service corporations and plants burning wood exclusively" in the present law is now pending in the Legislature and ought to pass.

EXAMINATION OF PLUMBERS.

During the past year weekly examinations have been held by the Board of Examiners of Plumbers, with the following result:

Number of applicants examined by the Board	211
Masters	58
Journeymen	153
Number of applicants certified for master's licenses	16
Number refused	42
Number of applicants certified for journeymen's licenses	69
Number refused	84

By the death of William H. Mitchell, in May, 1906, the Board of Examiners for Plumbers lost a valuable member. Mr. Mitchell had been the scientific, practical and paid member of the Board since its organization in 1893. In February, 1907, Mr. E. C. Kelly was appointed by the Board of Health to succeed Mr. Mitchell.

APPOINTMENTS.

May 7. The Board organized by the choice of Samuel H. Durgin, M.D., as chairman, and Charles E. Davis, Jr., as secretary.

July 24. Dr. Thomas B. Shea was appointed Chief Medical Inspector, having resigned his position as a member of the Board.

September 13. Dr. W. W. Howell was appointed Medical Inspector of Schools in place of Dr. H. B. Stevens, resigned.

November 6. Dr. Burdett Arms was appointed Assistant Bacteriologist.

November 24. Dr. Francis J. Keany was appointed Dermatologist. Dr. Keany has been given all consulting work required in his line by the eighty Medical Inspectors of Schools; and such other cases calling for this special work as come through the office.

November 30. Dr. F. W. McKeen was appointed a Medical Inspector of Schools in place of Dr. Otis Marion, deceased.

December 4. The following physicians were appointed additional Inspectors of Schools:

Frank L. Bishop,
John A. Hickey,
James T. Gallagher,
A. A. McCauley,
F. W. Rice,
E. J. Denning,
W. J. Sheehan,
D. P. Hayes,
H. J. Keenan,
Walter T. Fuller,
J. H. H. Kelley,
J. H. Costello,
Joseph J. O'Brien,
Harry Linenthal,
F. W. Sleeper,
Joseph A. Cogan,
W. J. L. O'Brien,
J. A. Reilly,
W. H. Greene,
Francis J. Giblin,
John T. Sullivan,
John J. Dowling,
Henry Harrison,
Patrick F. Butler,
John A. Ceconi,
John H. Moore,
Joseph Ascher.

December 14. The names of Drs. Christopher E. Williams, Simon F. Curran and Benjamin A. Graves were added to the list of Medical Inspectors of Schools.

December 31. Dr. William W. Campbell was appointed Assistant Bacteriologist in place of Dr. James J. Scannell, resigned.

SAMUEL H. DURGIN, M.D.,
Chairman.
WILLIAM H. HAYES,
MICHAEL W. NORRIS,
Commissioners.

FINANCIAL STATEMENT.

EXPENDED TO JANUARY 31, 1906.

Board of Health	$12,500 00	
Clerk-hire	11,717 05	
Messenger service	707 90	
Sanitary Inspectors	35,847 72	
Inspector of Animals and Meats	1,418 11	
Medical Officers	6,897 21	
Constables	554 04	
Disinfection	24,125 51	
Smallpox Hospital	6,505 07	
Contagious diseases other than smallpox	130 00	
Medical inspection of schools	10,348 44	
Vaccination	26 65	
Laboratory	10,364 02	
Nuisances	536 06	
Morgue	212 84	
Postage	2,268 00	
Telephones	2,123 11	
Travelling expenses — officers	1,928 44	
Office expenses	2,068 72	
Horse and vehicle — Board of Health and Medical Inspectors	2,339 18	
Stationery	757 23	
Printing	4,024 69	
Advertising	35 50	
Examination of plumbing and gasfitters,	315 00	
Inspection of milk and vinegar	10,743 29	
Inspection of provisions	3,511 12	
Superintendent of Pedlers	2,399 26	
Removal of building	9,309 42	
Quarantine, sundries, and Port Physician	2,992 06	
Quarantine, Gallop's Island	12,342 42	
" steamer "Vigilant"	12,553 50	
" steamer "Relief"	183 00	
Towns and cities on account of patients in City Hospital	1,466 45	
		$193,251 01

INCOME.

Quarantine (incoming vessels)	$5,916 00
Inspection of milk and vinegar (licenses),	839 00
Smallpox (care of patients)	192 92
Total	$6,947 92

REPORT OF CHIEF MEDICAL INSPECTOR.

To the Board of Health:

GENTLEMEN, — I have the honor to submit the following report for the year ending December 31, 1906.

INFECTIOUS DISEASES.

Variola. — There were nine cases reported and no deaths.

Diphtheria. — There were two thousand one hundred seventy-two (2,172) cases reported; one thousand one hundred fifty-seven (1,157) of these were cared for at the South Department of the City Hospital, 53.26 per cent. There were one hundred fifty-two (152) deaths. Mortality, 6 per cent.

Scarlet Fever. — There were one thousand three hundred forty-one (1,341) cases reported; six hundred ninety-eight (698) of these were cared for at the South Department of the Boston City Hospital, 52.05 per cent. There were twenty-nine (29) deaths. Mortality, 2 per cent.

Measles. — There were four thousand eight hundred forty (4,840) cases reported and sixty-one (61) deaths. Mortality, .01 per cent.

Typhoid Fever. — There were nine hundred eighty-nine (989) cases reported; six hundred ninety-four (694) were cared for at the different hospitals in this city. There were one hundred twenty-two (122) deaths. Mortality, 12 per cent.

Tuberculosis. — There were one thousand eight hundred twenty-nine (1,829) cases reported. There were one thousand one hundred seventy-one (1,171) deaths, four hundred two (402) of which had never been reported by any physician or institution, making a total of two thousand two hundred thirty-one (2,231) cases for the year.

Leprosy. — There was one case of leprosy reported.

During the past year, five hundred and nineteen persons died without a physician in attendance, and were reported to this office. In all these cases, a personal visit was made, the body examined, and a probable diagnosis made before granting a permit for burial. Fifty-three cases were referred to the medical examiner for investigation.

A tabular statement of the cases investigated is appended.

Tabular Statement of the Cause of Deaths investigated by the Medical Inspector for the Year ending December 31, 1906.

Bertillon Classification.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
II. General Diseases.													
Diphtheria and croup	1	....	....	1	....	....	....	....	....	....	....	...	2
Dysentery	....	....	....	....	....	....	....	1	2	1	....	....	4
Tuberculosis of lungs	7	1	5	6	3	4	2	5	5	4	....	3	45
Cancer of breast	....	....	....	....	....	....	....	....	....	....	....	1	1
Cancer of uterus	....	1	....	....	....	....	1	....	....	....	....	....	2
" others	....	....	....	....	1	....	....	3	....	1	1	....	6
Diabetes	....	....	....	....	....	....	....	1	....	....	1	....	2
Pernicious anæmia	....	....	....	1	....	....	....	....	....	1	....	....	2
Rheumatism	....	....	....	....	....	....	....	....	2	....	....	....	2
Whooping-cough	....	....	....	1	2	1	1	1	....	....	....	....	6
Total from general diseases,	8	2	5	9	6	5	4	11	9	7	2	4	72
II. Diseases of the Nervous System and of the Organs of Sense.													
Simple meningitis	....	1	1	2	....	....	....	....	1	....	....	....	5
Cerebral hemorrhage and congestion	2	2	....	4	4	1	1	2	2	....	4	3	25
Abscess of brain	....	....	....	....	....	....	....	....	....	....	1	....	1
Convulsions of infants	2	....	1	5	1	....	1	2	....	....	3	2	17
Chronic mania	....	1	....	....	....	....	....	....	....	....	....	....	1
Other diseases of the nervous system	....	....	1	....	2	....	1	....	1	1	....	3	9
Total of the nervous system	4	4	3	11	7	1	3	4	4	1	8	8	58
III. Diseases of the Circulatory System.													
Organic diseases of the heart,	10	2	7	9	8	11	11	11	16	6	13	15	119
Hemorrhage	....	....	....	....	....	....	1	....	....	....	....	....	1
Endocarditis	....	....	....	....	1	....	....	1	....	....	....	....	2
Angina pectoris	1	....	....	...	1	....	....	....	....	....	1	....	3
Other diseases of the circulatory system	....	....	....	1	....	....	....	1	1	...	....	....	3
Total of the circulatory system	11	2	7	10	10	11	12	13	17	6	14	15	128
Carried forward	23	8	15	30	23	17	19	28	30	14	24	27	258

STATEMENT OF THE CAUSE OF DEATHS.— *Continued.*

BERTILLON CLASSIFICATION.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Brought forward........	23	8	15	30	23	17	19	28	30	14	24	27	258
IV. Diseases of the Respiratory System.													
Acute bronchitis............	....	1	....	1	....	....	....	1	...	1	....	....	4
Chronic bronchitis...........	....	....	....	1	....	....	....	....	....	....	....	1	2
Pneumonia...................	2	2	5	3	2	....	2	....	1	....	4	7	28
Broncho pneumonia	....	1	2	1	2	....	....	2	....	1	1	....	10
Pul. hemorrhage.............	....	....	....	....	....	....	1	....	....	....	....	....	1
Total of the respiratory system..................	2	4	7	6	4	....	3	3	1	2	5	8	45
V. Diseases of the Digestive System.													
Infantile diarrhœa and athrepsia..................	...	1	....	....	1	2	7	5	4	....	....	1	21
Gastritis.....................	....	....	....	....	....	....	1	1	....	2	....	....	4
Hepatitis.....................	....	....	....	....	....	....	....	....	....	1	1	....	2
Strangulated Hernia.........	....	....	....	....	....	....	....	....	....	1	....	....	1
Total of the digestive system....................	....	1	....	....	1	2	8	6	4	4	1	1	28
VI. Diseases of the Genito-Urinary System and Adnexa.													
Acute nephritis..............	1	....	1	....	....	....	....	....	....	....	....	1	3
Bright's disease......	1	....	....	....	1	....	....	1	1	1	....	1	6
Cystitis	1	....	....	....	....	....	....	....	....	....	....	....	1
Total of the genito-urinary system....................	3	....	1	....	1	....	....	1	1	1	....	2	10
No deaths were examined in the classifications of VII., VIII., IX. and X.													
XI. Infantile.													
Congenital debility, icterus and scleroma........	4	5	2	6	3	1	6	2	6	8	5	4	52
Other diseases peculiar to infancy.....................	....	....	1	....	....	....	....	....	....	....	....	....	1
Total infantile..............	4	5	3	6	3	1	6	2	6	8	5	4	53
Carried forward...........	28	13	23	36	29	19	30	38	36	21	30	38	341

STATEMENT OF THE CAUSE OF DEATHS.—*Concluded.*

BERTILLON CLASSIFICATION.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
Brought forward........	28	13	23	36	29	19	30	38	36	21	30	38	341
XII. Old Age.													
Senile debility..............	3	1	3	2	1	....	1	2	3	3	3	....	22
Total from old age	3	1	3	2	1	....	1	2	3	3	3	....	22
XIII. External Violence.													
Other accidental injuries....	....	....	....	1	....	....	....	....	1	....	....	....	2
Heat prostration............	....	....	....	....	....	1	1	1	....	....	....	....	3
Total from external violence..	....	....	....	1	....	1	1	1	1	....	....	....	5
XIV. Ill-Defined Diseases.													
Unknown or not specified diseases	4	1	1	5	1	2	1	2	2	1	2	1	23
Total ill-defined diseases...	4	1	1	5	1	2	1	2	2	1	2	1	23
Still-births.....	2	1	3	1	2	2	2	1	1	1	4	2	22
Referred to medical examiner	2	4	1	4	2	4	6	7	6	4	6	7	53
Total......................	43	25	34	55	38	29	47	53	55	38	50	52	519

Respectfully submitted,

THOMAS B. SHEA, M.D.,
Chief Medical Inspector.

REPORT OF DIRECTOR OF BACTERIOLOGICAL LABORATORY.

To the Board of Health:

GENTLEMEN, — I have the honor to submit the following report for the year ending January 31, 1907.

TOTAL ROUTINE EXAMINATIONS.

The total number of routine bacteriological examinations made between February 1, 1906, and February 1, 1907, was 23,850. Of these, 18,845 were diagnoses and 5,005 were milk examinations.

STAFF.

Owing to the marked increase in the routine and investigative work, and to the large amount of work involved in making numerous rabies examinations, it became necessary during the fall to request the appointment of another assistant. Dr. Burdett Arms of the pathological department of the Boston City Hospital was secured for this position and was appointed on November 6, 1906. On January 18, 1907, Dr. J. J. Scannell, Milk Bacteriologist, resigned his position in order to engage in general practice. The resignation took effect at the end of the fiscal year, Dr. W. M. Campbell being appointed to take his place.

NEW METHODS AND DEVICES.

In the little time available for the purpose attention has been given to a method for digesting, shaking and centrifugalizing sputum, with the idea that by some such means the bacillus of tuberculosis might be found in those cases where the organisms were very few in number and where they might ordinarily be missed altogether if examined for in the ordinary way. This work has not progressed far enough to warrant an opinion being expressed except to say that the shaken specimens are much easier to smear, and that the shaking and consequent homogeneous condition of the sample is responsible for a slight increase in positive results as proved by comparative tests on 1,000 sputum specimens.

A new electrically driven centrifuge has been added to the equipment of the laboratory. This machine is arranged for various speeds up to 2,500 revolutions per minute and is especially adapted to the needs of the laboratory. It is so constructed as to hold practically any form of cup as well as a milk disc and is thus available for various kinds of work.

As soon as rabies became prevalent a collecting case, carrying dissecting knife, bone saw, rubber gloves, chloroform and carbolic acid was designed so that animal heads for examination might be obtained in the shortest possible time after notification was received.

A detailed account of the work performed during the year is given below in the following order:

1. Routine bacteriological diagnoses with tables.
2. Bacteriological examination of milk.
3. Special investigations.

PART I. — ROUTINE BACTERIOLOGICAL DIAGNOSES.

(A description of outfits used, technique employed and the interpretation of bacteriological findings may be found in previous annual reports.)

Table No. I. — Diphtheria.

SHOWING CULTURES CLASSIFIED.

	Positive.	Negative.	No Growth.	Total.
Primary	1,458	5,135	90	6,683
Secondary	1,858	3,478	42	5,378
Total	3,316	8,613	132	12,061
	28%	71%	1%	

The total number of diphtheria examinations exceeds that for 1905 by 4,730. There is an increase of 9 per cent. in positive results and a decrease of 1 per cent. in "no growths." The absolute diminution in "no growths" is thirty, although the total examinations have nearly doubled.

Table No. II.—Diphtheria.

SHOWING CASES CLASSIFIED.

	POSITIVE.		NEGATIVE.		NO GROWTH.	TOTAL.		TOTAL.			
	For Diagnosis.	For Release Only.	For Diagnosis.	For Release.	For Diagnosis Only.	For Diagnosis.	For Release Only.	Positive.	Negative.	No Growth.	Grand Total.
	1	2	3	4	5	6	7	8	9	10	
1906.											
February......	108	19	513	26	6	627	45	127	539	6	672
March	132	14	581	15	5	718	29	146	596	5	747
April............	109	11	509	14	3	621	25	120	523	3	646
May	83	9	374	21	3	460	30	92	395	3	490
June	97	10	305	26	9	411	36	107	331	9	447
July	66	13	180	18	6	252	31	79	198	6	288
August	53	10	162	10	1	216	20	63	172	1	236
September.......	76	11	201	12	2	279	23	87	213	2	302
October.........	146	10	268	15	8	422	25	156	283	8	447
November	173	24	454	19	4	631	43	197	473	4	674
December.......	183	15	606	20	2	791	35	198	626	2	826
1907.											
January....	145	23	800	27	3	948	50	168	827	3	998
	1,371	169	4,953	223	52	6,376	392	1,540	5,176	52	6,768

Column 1 shows the whole number of persons proving positive for diagnosis. In some of these cases the first culture was negative, but subsequent cultures for diagnosis were positive. Column 2 shows the total persons positive for release only, no culture (or in very few cases a negative culture) being taken for diagnosis. Column 3 shows cases negative throughout for diagnosis. A few of these were reported as diphtheria in spite of the negative cultures, but these proved negative for release also. Column 5 shows cases on which none but no growth cultures were received.

Table No. III. — Diphtheria.

SHOWING COMPARISON OF WORK DONE IN DIFFERENT YEARS.

Actual Number of Cultures and Persons Examined.

FEB. 1 to FEB. 1.	CULTURES.				PERSONS.				Cases Reported.
	Per Month.	For Diagnosis.	For Release.	Total.	Per Month.	Positive Diagnosis.	Negative Diagnosis.	Total Release.	
	1	2	3	4	5	6	7	8	9
1898 (estimated)	440	2,059	3,205	5,264	190	400	1,500	550	1,661
1899..................	660	4,408	3,522	7,930	380	1,019	2,920	1,002	2,836
1900 (approximate)..	1,560	8,000	10,889	18,889	700	2,100	5,600	2,000	5,020
1901..................	944	6,689	4,615	11,304	544	1,176	4,679	1,249	2,906
1902..................	660	5,506	2,223	7,729	438	726	4,140	781	1,881
1903..................	732	5,659	3,122	8,780	464	922	4,149	892	2,166
1904..................	770	5,986	3,251	9,237	479	1,047	4,219	985	2,440
1905..................	631	5,167	2,164	7,331	405	688	3,781	579	1,554
1906..................	1,005	7,817	4,244	12,061	564	1,371	4,953	933	2,266

Relative Number of Cultures and Persons Examined. (Calculated per 100 Cases Reported.)

1898..................	320	120	192	320	137	24	90	33	1,661
1899..................	280	155	124	280	160	36	103	35	2,836
1900..................	370	159	216	370	167	42	111	39	5,020
1901..................	380	230	158	380	224	40	161	42	2,906
1902..................	411	292	112	411	279	38	220	41	1,881
1903..................	405	261	144	405	257	42	191	41	2,166
1904..................	378	245	133	378	236	43	173	40	2,440
1905..................	471	332	139	471	313	44	243	37	1,554
1906..................	541	345	187	541	299	61	218	41	2,266

The number of cases reported to the Board during 1906 shows a decided increase over 1905, but is below that for 1904. The number of cultures examined monthly per 100 cases reported is the largest in the history of the laboratory (column 1). The relative number of positive cultures and persons is also the highest on record. The actual number of persons positive for diagnosis is practically double that of last year.

Out of 1,543 cultures received from institutions 405 were positive.

Table No. IV. — Diphtheria.

SHOWING AVERAGE LENGTH IN DAYS AND WEEKS FROM DATE OF FIRST POSITIVE TO SECOND NEGATIVE.

MONTH.	Number of Cases.	Average in Days.	Number Cases Running less than One Week.	Number Cases Running between One and Two Weeks.	Number Cases Running between Two and Three Weeks.	Number Cases Running more than Three Weeks.
February, 1906	47	18.5	2	9	14	22
March	62	9.8	11	22	23	6
April	40	11.3	5	17	13	5
May	34	14.8	1	16	13	4
June	54	14.5	5	29	10	10
July	27	13.4	3	13	6	5
August	21	10.0	6	11	3	1
September	33	10.4	2	17	9	5
October	58	16.2	7	22	14	15
November	88	17.0	13	24	20	31
December	57	17.9	3	20	17	17
January, 1907	66	18.5	5	22	19	20
Totals	587	15.1	63	222	161	141
			11%	38%	27%	24%

This table is necessarily based on those cases where cultures were submitted to the laboratory for diagnosis, the patient being also released later on by the laboratory. A large number of positive cases are removed to the City Hospital, and, being finally released from there, cannot be brought into this account.

It would appear that in the majority of cases patients are actually released from isolation quicker by requiring two consecutive negative cultures than if cases were released ten days after the disappearance of the membrane, as is the custom in many places. By the latter method some persons would be held an unnecessary length of time, while others would be released while carrying virulent diphtheria bacilli.

There were thirteen cases running over 5 weeks. Of these, one ran 76 days and another 54 days.

Virulence Tests. — Virulence tests have been made in those cases which ran for an abnormal length of time and in cases showing but few clinical signs. Of a total of 36 tests, 26 were positive and 10 negative. Of the cases showing negative results, 4 only had shown at the onset well marked symptoms. It was in fact particularly noticeable that in those cases showing a good clinical picture at the onset the virulence persisted up to the time of the disappearance of the organisms from the throat.

The increase in the total number of tests is probably due in part to the increase in the number of cases, and in part also to a decided increase in those cases which cleared rapidly, but in which organisms persisted.

TUBERCULOSIS.

All sputum specimens are now subjected to a vigorous shaking in a machine designed for the purpose. This results in the breaking up of coagulated masses, etc., and renders the sputum thoroughly homogeneous.* Experiments are now in progress to determine the value of adding a digestive agent before shaking in order to dissolve the mucus, following this by sedimentation in a centrifuge.

Examination of Urines for B. Tuberculosis.— If the examination of urine for B. tuberculosis is desired, it is best to send to the laboratory the whole amount passed in twenty-four hours. Special precautions should be taken to prevent contamination with smegma or other foreign matter.

Usually such cases require the inoculation of guinea pigs to establish the diagnosis, and the results are then available only after six weeks have elapsed.

Table No. I. — Tuberculosis.

MONTHLY TOTALS OF EXAMINATIONS.

MONTH.	Positive.	Negative.	Total.
February, 1906	74	222	296
March	79	272	351
April	79	332	411
May	79	290	369
June	89	261	350
July	103	215	318
August	70	201	271
September	59	218	277
October	78	309	387
November	67	273	340
December	82	294	376
January, 1907	99	410	509
Totals	958 23%	3,297 77%	4,255

The percentage of positive and negative results remains exactly the same as for 1905.

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* For a description of this machine and the results obtained by its use see Journal of Infectious Diseases, 1907, Supplement No. 3, p. 119.

Table No. II.—Tuberculosis.

SHOWING CASES CLASSIFIED.

Positive.	Negative.	Total.
871 24%	2,731 76%	3,602

Of the 871 positive cases, 96 per cent. (838) were found to be positive on the first examination, and 4 per cent. (33) on subsequent examinations. These per cents. are exactly the same as for 1905.

TYPHOID.

Table No. I.—Typhoid.

MONTHLY TOTALS OF WIDAL REACTIONS.

MONTH.	Positive.	Negative.	Atypical.	Totals.
February, 1906	5	65	4	74
March	8	57	4	69
April	3	81	4	88
May	7	88	4	99
June	4	89	2	95
July	4	90	5	99
August	41	158	24	223
September	55	204	27	286
October	63	136	21	220
November	19	116	13	148
December	14	133	5	152
January, 1907	9	65	3	77
Totals	232 14%	1,282 79%	116 7%	1,630

Attention was called last year to the fact that one-half of the positive typhoid reactions during the year were obtained during the months of August, September and October, the number for August being over double the number for July. The percentage of positives during the same months of 1906 is 68 per cent. The inference was drawn that a large number of cases are imported into Boston from summer resorts. Recent investigations * would tend to confirm this view.

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*Trans-American Public Health Association, 1905, Vol. XXXI., p. 108, and 1906, Vol. XXXII.

Table No. II. — Typhoid.

SHOWING CASES CLASSIFIED.

Positive.	Negative.	Unsatisfactory.	Total.
219 16%	1,059 80%	55 4%	1,333

MALARIA.

The greatest care should be exercised to obtain a *thin, even smear of blood upon the slide*, and the directions accompanying each outfit should be very carefully followed for this reason.

Malaria.

Positive.	Negative.	Unsatisfactory.	Total.
7 4%	183 96%	1	191

Although there has been an increase of nine in the total number of specimens examined, the number of positives have dropped 10, or 5 per cent.

GONORRHŒAL OPHTHALMIA.

The Legislature of 1905 made it obligatory on the part of the attending physician or nurse to report to the Board of Health any case of eye inflammation occurring within two weeks after birth. The laboratory is prepared to examine smears from any case of suspected gonorrhœal ophthalmia. Outfits for taking the smears may be obtained from any culture station.

Ophthalmia.

Positive.	Negative.	Unsatisfactory.	Total.
19 28%	47 68%	3 4%	69

RABIES.

The first specimen submitted to the laboratory in 1906 was sent on March 10, the disease having been prevalent for some time in other parts of the State.

In the previous nine years but ten rabies specimens in all were submitted to the laboratory. In 1906 47 cases were examined, of which 77 per cent. were positive.

Collection of Specimens. — Dogs or other animals having symptoms of rabies should not be killed, but should be confined securely and notification sent to the veterinarian of the Board of Health. If the suspected animal dies his whole carcass should be preserved and notification sent as above. Failing this the head at least should be preserved for examination.

Examination. — Impression smears are first made from portions of the Ammon's horn. If these prove positive further tests are unnecessary, and a report can be forwarded at once, often in from fifteen minutes to one-half hour after the brain is removed. If the impression smears show no Negri bodies, portions of the Ammon's horn and cerebellum are hardened, imbedded in paraffin and sectioned. An examination of sections from the Gasserian ganglia for pathological changes is of value, but not absolutely diagnostic of rabies. If these sections prove negative guinea pigs are inoculated under the dura with an emulsion of portions of the brain and cord.

In the latter case, if positive, it is usually from ten days to two weeks before symptoms are noted, and they may be delayed for a much longer period of time.

Table No. I. — Rabies.

SHOWING CASES CLASSIFIED.

Positive.	Negative.	Total.
36	11	47
77%	23%	100%

Table No. II. — Rabies.

SHOWING POSITIVE RESULTS CLASSIFIED.

Impression Smears.	Ammon's Horn.	Cerebellum.	Animal Inoculation.	Total.
23	7	....	6	36
64%	19.4%	....	16.6%	100%

The above table shows in what manner the positive results were *first* obtained. As the Negri bodies were found in the impression smears in 64 per cent. of the positive cases, and as these smears could be made and stained as soon as the brain was removed from the animal, the great saving in time in making the diagnosis can be readily appreciated. In two cases negative for Negri bodies the Gasserian ganglia showed small cell infiltration and the animals inoculated gave positive results. In two other cases the brain was badly decomposed when received. Animal tests were made on all but four cases. The average length of time between the inoculation of animals and the first symptoms was 17.12 days. In two cases the animals were still living at the time of writing. The longest period of incubation was 49 days and the shortest 8 days.

GLANDERS.

Table No. I. — Glanders.

MONTHLY TOTALS OF GUINEA-PIG TESTS.

MONTH.	Positive.	Negative.	Unsatisfactory.	Total.
February, 1906	3	9	8	20
March	4	8	5	17
April	10	15	0	25
May	7	14	1	22
June	6	7	5	18
July	5	6	6	17
August	5	11	7	23
September	5	14	2	21
October	5	14	0	19
November	17	3	4	24
December	4	6	3	13
January, 1907	14	17	8	39
Totals	85	124	49	258

Table No. II. — Glanders.

SHOWING CASES CLASSIFIED ON GUINEA-PIG TESTS.

MONTH.	Positive.	Negative.	Unsatisfactory.	Total.
February 1, 1906, to February 1, 1907	42	41	17	100

In previous years the infected swabs have been placed in about 5 cubic centimeters of sterile water and the material removed from the swabs by rubbing against the sides of the tube. One c.c. of this suspension was then inoculated into the peritoneum of a full grown male guinea pig. As a certain percentage of pigs thus inoculated died from peritonitis before the glanders organisms, if present, could have had time to multiply and cause lesions, and as some cases negative on the first examination were positive on a secondary test, two pigs have been inoculated in practically every case during the past year, one pig receiving 1 c.c. and the other ½ c.c., except in certain secondary cases where the first being unsatisfactory (peritonitis) only ¼ c.c. was inoculated for the second test.

Out of 42 positive cases —

In 17 cases the 1 c.c. pig developed testicular lesions first.

In 7 cases the ½ c.c. pig developed testicular lesions first.

In 15 cases both developed testicular lesions simultaneously.

In 8 cases the 1 c.c. pig was positive and the ½ c.c. pig negative.

In 7 cases the ½ c.c. pig was positive and the 1 c.c. pig negative.

In brief, then, the 1 c.c. pigs develop as a rule more rapidly, but if one pig only had been used and inoculated with 1 c.c., then 7 cases, or 16.6 per cent. of the positive cases, would have been missed.

Of the 17 unsatisfactory (peritonitis) cases, both the 1 and ½ c.c. pigs died on the same day in all but three cases, in two of which the ½ c.c. pig outlived his mate.

OTHER EXAMINATIONS.

Any disease of a bacteriological nature will be examined for free of charge. Before collecting specimens from diseases other than those already enumerated communication should be had with the laboratory.

Miscellaneous Examinations.*

Positive.	Negative.	Unsatisfactory.	Total.
119 35.6%	203 60.8%	12 3.6%	334

*This table does not include rabies, heretofore classed under this heading. Rabies tables may be found on page 69.

Special examinations during the past year have included examinations for the organisms causing influenza, pneumonia, gonorrhœa, paratyphoid, actinomycosis, xerosis of conjunctiva, syphilis (s. pallida) and leprosy.

The above table also includes tests for diphtheria, virulence, tests of pus, urine, spinal and pleuritic fluid and faeces for the organism of tuberculosis, and tests for ptomaine poisoning and of typhoid urine for the typhoid bacillus.

Table Summarizing Routine Examinations for Year Ending January 31, 1907.

MONTH.	Diphtheria.	Tuberculosis.	Typhoid.	Glanders.	Malaria.[1]	Ophthalmia.[2]	Rabies.	Other Diseases.[3]	Total.	Milk Examinations.	Grand Total.
February, 1906	985	296	74	20	13	7	0	15	1,410	458	1,868
March	1,201	351	69	17	5	4	4	34	1,685	479	2,164
April	1,022	411	88	25	14	4	3	19	1,586	543	2,129
May	816	369	99	22	16	7	3	13	1,345	263	1,608
June	766	350	95	18	15	14	3	18	1,279	243	1,522
July	550	318	99	17	28	2	4	18	1,036	227	1,263
August	405	271	223	23	22	2	2	20	968	435	1,403
September	484	277	286	21	30	0	1	26	1,125	353	1,478
October	746	387	220	19	25	4	4	49	1,454	554	2,008
November	1,326	340	148	24	13	3	12	32	1,898	423	2,321
December	1,510	376	152	13	7	11	3	46	2,121	422	2,543
January, 1907	2,250	509	77	39	3	11	8	44	2,938	605	3,543
	12,061	4,255	1,630	258	191	69	47	334	18,845	5,005	23,850

[1] Seven positives.
[2] Nineteen positives.
[3] Including gonorrhœa, pneumonia, influenza, etc.

The total number of routine examinations made during the year exceeds that of any other year by over twenty-five hundred. The number of diphtheria examinations exceeds that of any year except 1900, when diphtheria was very prevalent. The number of tuberculosis examinations continues to increase yearly. All other totals show an increase, with the exception of the milk examinations, which are limited in number by the nature of the tests.

CHART SHOWING TESTS PER MONTHS OF THE THREE MOST COMMON EXAMINATIONS. POSITIVE RESULTS ARE GIVEN IN RED.

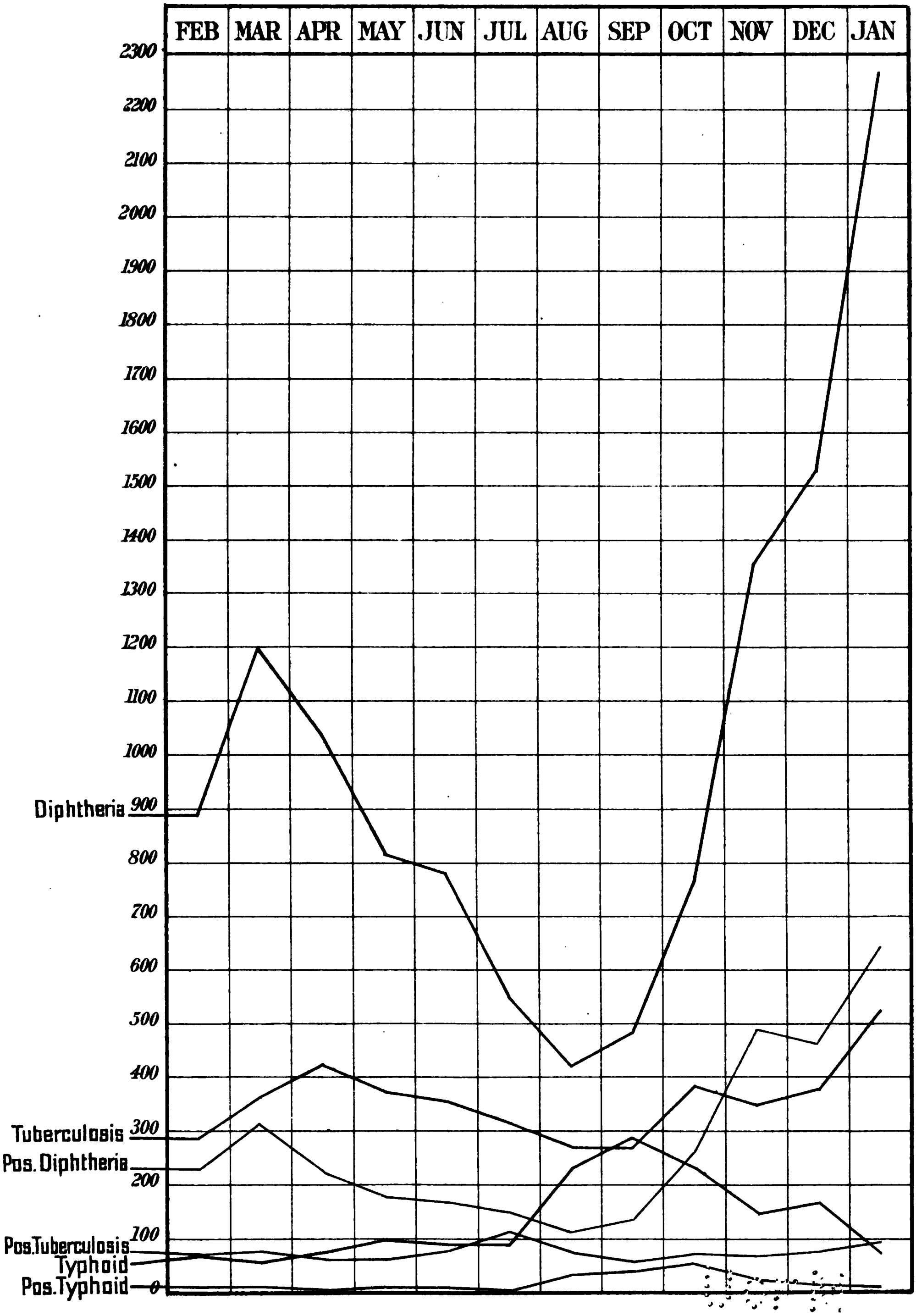

Table Summarizing Routine Examinations for Nine Years Ending January 31, 1907.

YEAR.	Diphtheria.	Tuberculosis.	Typhoid.	Glanders.	Malaria.	Ophthalmia.	Rabies.	Other Examinations.	Milk Examinations.	Total.	Average per Day.
1898-1899 (9 mos.),	3,948	....	122	......	.....	.....	3	.....	....	4,073	15
1899-1900	7,930	....	483	65	19	.....	2	27	....	8,526	24
1900-1901	18,889	1,021	1,014	119	38	.....	0	44	....	21,125	57
1901-1902	11,304	1,957	1,049	158	85	.....	0	52	....	14,605	40
1902-1903	7,729	2,322	984	140	98	.....	0	32	....	11,305	31
1903-1904	8,780	2,914	1,088	175	98	.....	1	45	....	13,101	36
1904-1905	9,237	3,115	1,164	147	134	.....	3	88	3,468	17,356	47
1905-1906	7,331	3,650	1,281	174	182	40	1	103	5,559	18,321	50
1906-1907	12,061	4,255	1,630	258	191	69	47	334	5,005	23,850	65
	87,209	19,234	8,815	1,236	845	109	57	725	14,032	132,262	41

PART II. — BACTERIOLOGICAL EXAMINATION OF MILK.

1. *Routine Bacteriological Milk Examinations.*

During the year 5,005 examinations have been made of samples of milk for bacterial content, the presence of pus and pus producing organisms. A detailed account of the technique employed may be found in the annual report of 1905. The following is a brief summary of the work done:

Total number of samples examined	5,005
Number of samples showing over 500,000 bacteria per cubic centimeter . . .	1,111 = 22.000%
Number of samples passed by microscopic method alone	2,568 = 51.000%
Number of samples showing presence of pus,	100 = 2.000%
Number of samples showing streptococci .	133 = 2.600%
Number of samples showing both streptococci and pus	13 = .002%

Table Showing Bacterial Content of Milk as Seized from Various Sources During the Year.

WHERE OBTAINED.	Number of Samples.	Count above 500,000 to a Cubic Centimeter.
Contractors..	3,755	10%
Wagons..	620	49%
Stores..	516	75%
Unclassified...	114	34%

The collection of bacteriological milk samples and enforcement of the bacteriological milk regulations are under the charge of Mr. James O. Jordan, Inspector of Milk, into whose hands have been placed daily (card catalogue) and monthly reports showing the results of the above work in detail.

2. *Special Milk Tests.*

In addition to the above the Boston Floating Hospital was supplied during the summer months with the necessary sterile apparatus for making bacterial counts on milk, whey, etc. Counts were also made from time to time to verify the results obtained by them on their tests.

3. *Investigative Milk Work.*

The following experiments relating to the technique of the milk examinations have been carried on by Dr. F. H. Slack, from time to time during the past two years as the points in question have been raised:

A. Optimum Percentage Agar and Reaction for Media used in Plating Milk Samples.

Lot 1. — 1½ per cent. agar; reaction, + 7. Made according to standard methods.*

Lot 2. — 1 per cent. agar; reaction, + 1.5. Made according to the directions of Mr. S. DeM. Gage of the Lawrence Experiment Station.

Lot 3. — 1 per cent. agar; reaction, + 1.5. Made according to standard methods.

One hundred and seventeen samples were compared, each being plated in triplicate, on these three media.

Incubation was for twenty-four hours in a saturated atmosphere at 37° centigrade.

Of the three thus compared on any single sample, the one having the largest number of colonies was entered as having the highest count, next highest as next highest count, etc. Where the count on two plates was the same both were entered at the same standing, in which case no "lowest count" was recorded. Lot three was by far the best.

	LOT 1.	LOT 2.	LOT 3.
	Plates.	*Plates.*	*Plates.*
Highest count	27	37	71
Next highest count	44	60	37
Lowest count	46	20	9

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* Standard Methods of Water Analysis. Journal of Infectious Diseases Supplement No. 1, May, 1905. Wherever standard methods are referred to the above are indicated.

The following agars made by standard methods were then tested against each other:

Lot 1. — 1½ per cent. agar; reaction, + 1.5
Lot 2. — 1 per cent. agar; reaction, + .7
Lot 3. — 1 per cent. agar; reaction, + 1.5
Lot 4. — 1½ per cent. agar; reaction, + .7

Comparative tests made as before with the routine milk samples of the laboratory, each sample being plated on the four media, dilution 1–10,000. Incubated in a saturated atmosphere at 37° centigrade for 24, 48, 72 and 96 hours.

The number of countable plates constantly decreased as the length of the incubation increased.

24-Hour Table. (145 Plates Each.)

	LOT 1.	LOT 2.	LOT 3.	LOT 4.
	Plates.	*Plates.*	*Plates.*	*Plates.*
Highest count	53	25	74	41
Second highest count	57	61	50	60
Third highest count	27	36	16	34
Lowest count	8	23	5	10

48-Hour Table. (112 Plates Each.)

	LOT 1.	LOT 2.	LOT 3.	LOT 4.
	Plates.	*Plates.*	*Plates.*	*Plates.*
Highest count	44	23	53	28
Second highest count	41	39	38	40
Third highest count	21	36	16	35
Lowest count	6	14	5	9

72-Hour Table. (79 Plates Each.)

	LOT 1.	LOT 2.	LOT 3.	LOT 4.
	Plates.	*Plates.*	*Plates.*	*Plates.*
Highest count	24	18	36	22
Second highest count	34	29	24	29
Third highest count	18	20	15	15
Lowest count	3	12	4	8

96-Hour Table. (62 Plates Each.)

	Lot 1.	Lot 2.	Lot 3.	Lot 4.
	Plates.	*Plates.*	*Plates.*	*Plates.*
Highest count	25	13	28	18
Second highest count	19	23	20	14
Third highest count	15	12	11	25
Lowest count	3	14	3	5

Lot 3, identical with Lot 3 of the previous experiments, again easily stood first in all these incubation periods. As a result of this work the laboratory has adopted for its standard media for bacteriological milk examinations agar made similar to Lot 3 in the above experiments.

B. Methods of Mixing Milk for taking Bacteriological Samples.

The samples in the following tables were all taken from eight-quart cans and from clean and dirty milks alternately in order to give as thorough a test as possible. The samples in all cases are kept sufficiently cold to prevent any increase of bacteria between the times of sampling and plating. The report is made on the 1–10,000 dilution and 24-hour incubation.

Since minor differences in milk counts are within the working error of the methods and are of no significance in practice, the following scale for showing the number of bacteria to a cubic centimeter has been adopted for reporting results:

Below 50,000
100,000
150,000
200,000
250,000
300,000
350,000
450,000
Below, at or above
500,000

Above 600,000
700,000
800,000
900,000
1,000,000
1,200,000
1,400,000
1,600,000
1,800,000
2,000,000

Above 2,500,000
3,000,000
3,500,000
4,000,000
4,500,000
5,000,000
6,000,000
etc., by millions.

Table I.

SAMPLE NUMBER.	METHOD 1.								METHOD 2.							
	Method of Mixing.	24-HOUR COUNT.			48-HOUR COUNT.			Report.	Method of Mixing.	24-HOUR COUNT.			48-HOUR COUNT.			Report.
		1 to 100.	1 to 10,000.	1 to 1,000,000.	1 to 100.	1 to 10,000.	1 to 1,000,000.			1 to 100.	1 to 10,000.	1 to 1,000,000.	1 to 100.	1 to 10,000.	1 to 1,000,000.	
1	Shaking can	......	332	5	......	406	12	3,000,000	Poured into clean can	......	407	3	......	525	10	4,000,000
2	"	20	0	......	21	1	......	50,000	Poured into can 1	109	3	......	193	4	......	50,000
3	"	......	403	4	......	640	8	4,000,000	Poured into can 2	......	352	5	......	532	13	3,500,000
4	"	35	0	......	41	0	......	50,000	Poured into can 3	541	4	......	714	13	......	50,000
5	"	......	195	2	......	359	5	1,800,000	Poured into can 4	......	196	2	......	358	3	1,800,000
6	"	35	0	......	49	0	......	50,000	Poured into can 5	334	2	......	535	5	......	50,000
7	"	......	92	1	......	112	1	900,000	Poured into can 6	......	112	2	......	126	2	1,000,000
8	"	122	2	......	145	3	......	50,000	Poured into can 7	203	3	......	262	5	......	50,000
9	"	......	21	0	......	33	0	200,000	Poured into can 8	......	36	1	......	56	2	400,000
10	"	31	1	......	33	3	......	50,000	Poured into can 9	139	2	......	212	6	......	50,000
11	"	......	71	3	......	101	6	700,000	Poured into can 10	......	81	2	......	112	2	800,000
12	"	19	0	......	23	0	......	50,000	Poured into can 11	240	4	......	257	6	......	50,000
13	"	......	241	3	......	406	6	2,000,000	Poured into can 12	......	277	3	......	463	12	2,500,000
14	"	4	1	......	9	3	......	50,000	Poured into can 13	491	4	......	636	16	......	50,000

The difference in the reports is very slight even where a good milk was poured into a dirty can, the influence of the few cubic centimeters of dirty milk not being sufficient to alter the report, though a striking increase is noted in the 1 to 100 plates; ten cubic centimeters of dirty milk (say 5,000,000 bacteria to the cubic centimeter) would raise the bacterial content of 8,000 cubic centimeters of pure milk but 6,250 bacteria to a cubic centimeter or less than one coloring on a 1 to 10,000 plate.

Table II.

SAMPLE NUMBER.	METHOD 3.								METHOD 4.							
	Method of Mixing.	24-HOUR COUNT.			48-HOUR COUNT.			Report.	Method of Mixing.	24-HOUR COUNT.			48-HOUR COUNT.			Report.
		1 to 100.	1 to 10,000	1 to 1,000,000	1 to 100.	1 to 10,000.	1 to 1,000,000.			1 to 100.	1 to 10,000.	1 to 1,000,000.	1 to 100.	1 to 10,000.	1 to 1,000,000.	
1	Shaking the can, then stirring the milk with large sterile collecting pipette.	....	288	5	....	338	5	2,500,000	Pouring into empty can and back, the same can being used for all the samples.	....	273	4	....	325	6	2,500,000
2		*1,500	38	....	*1,800	55	....	400,000		*1,900	36	....	*1,700	50	....	400,000
3		....	740	11	....	810	14	7,000,000		....	700	10	....	735	10	7,000,000
4		506	6	....	552	8	....	100,000		565	5	....	660	10	....	50,000
5		....	246	6	....	279	6	2,000,000		....	209	3	....	231	5	2,000,000
6		534	10	....	690	16	....	100,000		728	8	....	700	17	....	100,000
7		....	838	15	....	929	19	8,000,000		....	996	12	....	925	13	9,000,000
8		750	13	....	985	20	....	150,000		878	8	....	1,135	12	....	100,000
9		....	756	4	....	*1,200	5	7,000,000		....	740	10	....	785	11	7,000,000
10		930	15	....	945	17	....	150,000		804	8	....	765	14	....	100,000
11		....	850	11	....	900	14	8,000,000		....	900	9	....	880	15	9,000,000
12		*4,000	74	....	*4,000	84	....	700,000		*4,000	72	....	*4,000	88	....	700,000
13		....	520	6	....	620	6	5,000,000		....	486	8	....	570	8	4,500,000
14		278	2	....	360	4	....	50,000		316	4	....	374	6	....	50,000

* Estimated.

As in the previous table, the reported counts are but slightly affected by the method of sampling. No. 3 compares very closely with No. 4, where the milk is turned over twice.

Table III.

SAMPLE NUMBER.	METHOD 3.								METHOD 5.							
	Method of Mixing.	24-HOUR COUNT.			48-HOUR COUNT.			Report.	Method of Mixing.	24-HOUR COUNT.			48-HOUR COUNT.			Report.
		1 to 100.	1 to 10,000.	1 to 1,000,000.	1 to 100.	1 to 10,000.	1 to 1,000,000.			1 to 100.	1 to 10,000.	1 to 1,000,000.	1 to 100.	1 to 10,000.	1 to 1,000,000.	
1	Shaking the can, then stirring the milk with large sterile collecting pipette.	....	*1,200	13	....	*1,200	25	12,000,000	Mixing with cone shaped cream mixer, all the samples being mixed with same piece of apparatus.	†	....	....	....	....	....	....
2		223	7	....	334	8	....	100,000		250	1	....	340	‡	....	50,000
3		....	85	2	....	104	5	800,000		....	56	1	....	68	1	500,000
4		251	2	....	297	2	....	50,000		249	1	....	339	1	....	50,000
5		....	341	2	....	356	7	3,000,000		....	189	0	....	197	0	1,800,000
6		192	3	....	269	3	....	50,000		195	1	....	222	4	....	50,000
7		....	41	0	....	49	0	450,000		....	21	0	....	32	0	250,000
8		215	4	....	242	6	....	50,000		228	3	....	307	4	....	50,000
9		....	139	0	....	169	0	1,200,000		....	131	3	....	156	3	1,200,000
10		206	3	....	298	4	....	50,000		222	5	....	297	5	....	50,000
11		....	173	3	....	210	3	1,600,000		....	151	4	....	165	4	1,400,000
12		186	3	....	262	3	....	50,000		216	0	....	276	2	....	50,000
13		....	240	2	....	305	3	2,000,000		....	205	2	....	239	3	2,000,000
14		550	6	....	506	12	....	100,000		435	6	....	465	7	....	100,000

The count after stirring with the cream mixer is lower in some cases, though the 1 to 100 plates show practically the same, and as the shaking and stirring method is shown in previous tables to compare very favorably with others where a complete mixture is known to have been obtained by pouring, it is probably more correct.

* Estimated. † Tube containing this sample broken. ‡ Spread.

Of the methods described, Nos. 2, 4 and 5, even though the results are about the same, are inadvisable since a portion of the previous milk tested is carried into each new sample.

Nos. 1 and 3 can hardly be criticised, since when contrasting them with these other methods where perfect mixture is known to have been made the same results are obtained and there is no contamination from other samples.

No. 3 is the method now in use for mixing when collecting bacteriological milk samples for this laboratory. These figures are not intended to apply to collection of samples for certified milk.

PART III. — SPECIAL INVESTIGATIONS.

The following investigations, inspections and analyses have been made at the request of the Board:

Pollution of Shellfish by Sewage.

An investigation was begun in October, 1906, to determine by bacterial methods the amount of pollution by sewage of the clams and lobsters coming from Boston harbor, and of the clams, oysters and lobsters from a number of other sources which contribute to supply the Boston market.

Sources of Supply.

According to statements made by Boston dealers, a large proportion of the clams supplying the Boston market come from either Cape Cod or Maine. A small amount come from Ipswich and from Newburyport. Those previously dug in Boston harbor were probably in part used for bait, and were in any event but a small fraction of the total number coming into Boston.

Oysters come largely from Chesapeake bay, Long Island and adjacent waters, from the Providence river and Narragansett bay and from the Cape. No oyster beds are to be found in the limits of Boston harbor. One storage bed formerly existed off the Bird Island flats, but this has been abandoned of late.

The number of lobsters coming from Boston harbor is evidently a very small part of the whole. A large amount are brought from Maine and Nova Scotia.

Collection of Specimens.

Clams were obtained from various parts of Boston harbor by a clam digger working under the personal direction of

Commissioner Norris. On the Squantum side of the Neponset river and the Everett side of the Mystic river clam diggers were at work at the time the samples were taken. Clams were also bought from three different wholesale stores, and, in the case of Maine and Nova Scotia clams, from the boat. No clams were taken from the Charles river owing to the high tides. Previous work by this laboratory has, however, shown Charles river clams to be badly polluted.*

As no oysters could be obtained in the harbor, oysters were obtained from three Boston dealers, from Chesapeake bay and from two places on the Providence river.

Lobsters were taken from various parts of Boston harbor and from the Maine and Nova Scotia boats.

Technique of Examination.

1. *Clams and Oysters.* — From each lot of clams and oysters ten specimens were selected at random. In opening the shells, aseptic precautions were observed, the hands of the operator having been disinfected, the shell flamed with alcohol and the instruments used sterilized. Portions of the intestines and surrounding tissue were removed, macerated in sterile water, and portions of this material used for inoculating fermentation tubes and litmus lactose agar plates. Samples of the water contained in the shells were also tested. At the end of twenty-four hours the plates were examined for red colonies from which cultures were made, which were afterward examined microscopically and then put through regular species tests for either *B. coli* or the sewage streptococcus. From the fermentation tubes, litmus lactose agar plates were made at the end of twenty-four hours in all cases where gas had formed, and at the end of forty-eight hours in any event. Thus cultures were obtained which could be tested for sewage organisms in case negative results were obtained from the original plate. As in many cases the preliminary tests were positive while subsequent tests proved the organisms in question to be neither *B. coli* nor the sewage streptococcus, the total number of species tests made was exceedingly large, often materially delaying the progress of the work owing to lack of sufficient incubator space.

Organisms were identified as *B. coli communis* only when they agreed fully with the tests outlined in the Report of the Committee on Standard Methods of Water Analysis of the American Public Health Association,† while in identifying the sewage streptococcus of Houston, the species characteristics as outlined by Prescott and Baker* were followed.

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* Annual Report Boston Board of Health 1900, p. 84.

† Transactions American Public Health Association, 1905.

2. *Lobsters.* — Portions of the claw, belly meat and intestines were obtained and treated as described for clams and oysters, with the exception that it was found necessary to macerate the meat with sterile water in small sterile mortars.

Results.

Table No. I. — Clams.

CLAMS FROM	Date.	Per Cent. Showing Sewage Organisms.	Per Cent. Showing *B. Coli* Only.	Per Cent. Showing Sewage Streptococci Only.	Sewage Organisms found in Shell Water.	Remarks.
Neponset river, Boston side	Oct. 23, 1906	100%	0%	100%	No	
Neponset river, Squantum side	Oct. 28, 1906	90%	20%	80%	Yes	Clam diggers at work.
Mystic river, Charlestown side	Nov. 21, 1906	100%	0%	100%	Yes	
Mystic river, Charlestown side	Nov. 21, 1906	100%	0%	100%	Yes	
Mystic river, Everett side.	Nov. 21, 1906	100%	10%	100%	Yes	Clam diggers at work near gas tank.
Mystic river, Everett side.	Nov. 21, 1906	100%	0%	100%	Yes	Clam diggers at work near gas tank.
Long Island, west head	Oct. 23, 1906	100%	40%	100%	Yes	About three-quarters mile from sewer outlet.
Moon Island, head	Oct. 28, 1906	100%	0%	100%	Yes	400 to 500 feet from sewer outlet.
Thompson's Island, south side	Nov. 5, 1906	90%	0%	90%	Yes	
Spectacle Island	Nov. 7, 1906	100%	10%	90%	Yes	Opposite side to garbage plant.
Peddock's Island, west side	Nov. 7, 1906	100%	0%	100%	Yes	About 300 yards from sewer outlet.
Deer Island, head	Nov. 7, 1906	80%	10%	80%	Yes	Point near sewer outlet.
Digby, N. S.	Nov. 19, 1906	30%	0%	30%	Yes	Severe tests.
Winter Harbor, Me.	Nov. 20, 1906	60%	0%	60%	Yes	Severe tests.
Boston Market Clams No. 1, from Yarmouth, Mass.	Dec. 22, 1906	0%	0%	0%	Yes	In shell.
Boston Market Clams No. 2, from Barnstable	Jan. 9, 1907	70%	30%	50%	Yes	In shell.
Boston Market Clams No. 3, from Ipswich	Jan. 9, 1907	60%	0%	60%	Yes	In shell.

As will be seen from the above table, the clams obtained from Boston harbor were with but few exceptions grossly polluted by sewage. In 8 out of the 11 harbor lots obtained, every clam tested (10 to each lot) contained sewage organisms. Out of the remaining 4 lots of 10 clams each, but 6 clams were found unpolluted.

Of the clams purchased in the open market, unshucked, one lot, said to come from Yarmouth, Mass., was found absolutely free from sewage bacteria; a second lot coming from another portion of the Cape showed 70 per cent. contaminated, two different kinds of sewage organisms being found; while a third lot said to come from Ipswich showed 60 per cent. polluted.

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* Prescott and Baker. Journal of Infectious Diseases, Vol. 1, page 193.

In one lot of clams from Nova Scotia but 3 out of 10 showed sewage organisms, while in a lot obtained from Maine 6 out of 10 were polluted. In justice to these last two lots it should be stated that the sewage organisms were but few in number, far less than ordinarily found in polluted clams, and as a matter of fact were obtained only after an unusually severe test, a much larger amount of material than usual being taken for the examination.

The water from the shells of the clams showed in every instance but one the presence of sewage organisms.

Table II. — Oysters.

OYSTERS FROM	DATE.	Per cent. Showing Sewage Organisms.	Per cent. Showing *B. Coli* only.	Per cent. Showing Sewage Streptococci only.	Sewage Organisms Found in Shell Water.
Bullock's Point, Providence river,*	Dec. 6, 1906......	30%	0	30%	Yes.
Wickford, R. I.*....................	Dec. 6, 1906......	20%	0	20%	No.
Boston market oysters, No. 1, Wellfleet, Mass..................	Dec. 20, 1906......	0	0	0	No.
Boston market oysters, No. 2, Oysterville.......................	Jan. 9, 1907......	10%	0	10%	No.
Boston market oysters, No. 3, Cape.............................	Jan. 9, 1907......	30%	0	30%	No.
York river, Chesapeake bay.......	Dec., 1906......	10%	0	10%	No.

* Tests unusually severe, double the amount of material being taken.

2. *Oysters.* — The oysters tested showed as a rule but slight contamination. One set of samples, bought from a Boston dealer, showed absolutely no trace of sewage organisms, while the remaining lots were but slightly polluted.

In only one case (Bullock's Point) did the water in the shell show sewage organisms.

It is possible that local conditions as to currents, ice formations, etc., may have some effect on the amount of pollution of parts of an oyster bed. In at least one case given above, the bed in question is so located that it must necessarily at times be exposed to considerable sewage pollution. Other portions seem to be more or less protected.*

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*The distribution of sewage in the waters of Narragansett bay, with especial reference to the contamination of the oyster beds: Fuller, Bulletin 569, Department Commerce and Labor, Bureau of Fisheries, 1905.

Table III.

Number.	OBTAINED FROM	Date.	Time in Float.	*B. Coli* Found.	Sewage Streptococci Found.	Condition of Lobster when Seized.
1	Float, Boston wharf (Maine lobster) *	Oct. 18, 1906	24 hours.	Yes.	Yes.	Alive.
2	" " "	" "	24 hours.	No.	Yes.	Alive.
3	" " "	" "	24 hours.	No.	Yes.	"Sleeper."
4	" " "	" "	4 days.	No.	Yes.	Alive.
5	" " "	" "	4 days.	No.	Yes.	Alive.
6	" " "	" "	4 days.	No.	Yes.	"Sleeper."
7	" " "	" "	6 days.	Yes.	Yes.	Alive.
8	" " "	" "	6 days.	No.	Yes.	Alive.
9	" " "	" "	6 days.	No.	Yes.	"Sleeper."
10	" " "	" "	8 days.	No.	Yes.	Alive.
11	" " "	" "	8 days.	Yes.	No.	Alive.
12	" " "	" "	8 days.	Yes.	Yes.	"Sleeper."
13	About 500 yards northeast Deer island sewer outlet	Oct. 19, 1906		No.	Yes.	Alive.
14	1½ miles east Deer island light, edge of channel	" "		No.	Yes.	Alive.
15	Half way between Moon and Deer island sewer outlets	" "		No.	No.	Alive.
16	300 yards from outlet of sewer near Peddock's island	" "		Yes.	Yes.	Alive.
17	Near Long island, between Government and City wharves	" "		No.	Yes.	Alive.
18	Eastport, Maine	Nov. 20, 1906		No.	No.	Alive.
19	Stonington, Maine	" "		No.	No.	Alive.
20	South Addison, Maine	" "		No.	No.	Alive.
21	Bought at market	Dec. 26, 1906	?	No.	Yes.	Alive.
22	Nova Scotia	Jan. 3, 1907		No.	Yes.	Alive.
23	"	" "		No.	No.	Alive.
24	"	" "		No.	No.	Alive.

* A sample of the water taken from around these floats showed abundant evidence of sewage pollution.

Table No. IV. — Lobsters.

Showing Percentage of Infection with Sewage Organisms.

[Total number of lobsters tested, 24.]

	Total Number of Specimens showing Sewage Infection.	*B. Coli* Found.	Sewage Streptococcus Found.
Number of specimens..................	18	5	17
Percentage....	75%	21%	72+%

Of the 13 lobsters bought in Boston, having previously been kept in lobster floats, all (100 per cent.) contained sewage organisms.

Of 5 caught in Boston harbor, 4 (80 per cent.) were infected.

Of 6 obtained as they came into Boston (Maine and Nova Scotia lobsters), 1 (16⅔ per cent.) was infected.

As the lobsters kept in these floats were said to be Maine and Nova Scotia lobsters, it may be safely inferred that lobsters from unpolluted sources become rapidly infected when placed in floats where the water is so grossly and continuously * polluted.

Cooking Experiments.

In order to determine to what extent sewage organisms are destroyed in the ordinary processes of cooking, a series of cooking experiments were undertaken.

The oysters and clams used in these experiments were infected by keeping in a mixture of one part sewage and three parts sea water for from two to three days. The lobsters were infected by the injection of broth cultures of the sewage streptococcus and *Bacillus coli* through the shell of the claw and into the belly.

By arrangement with Miss Farmer of Miss Farmer's School of Cookery the experiments were conducted at that place, using the recipes there employed.

A first-class hotel and a first-class restaurant were also visited and the average length of exposure to heat in the various processes of cooking shellfish obtained. In those cases where the length of time differed materially from that used at the cooking-school both were tried or a note made indicating the difference.

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* See also Annual Report Boston Board of Health, 1905, p. 77.

Methods of Cooking.

In the following experiments the shellfish were exposed to but little heat after being taken from the fire, the intestines, etc., being removed with all possible haste.

Steamed Clams. — Clams, having been thoroughly washed, were placed in a large kettle which contained a small amount of hot water and allowed to steam until the shells opened (about three minutes). In a second experiment they were allowed to steam ten minutes and in a third fifteen minutes. Three minutes is probably the minimum time that would ever be given, while fifteen is excessive.

Clams Fried in Batter. — Clams cleaned and dried were dipped in batter and fried in fat. The temperature of the fat at the start was 210° centigrade. The lowest temperature reached was 174° centigrade, the average temperature maintained being in the neighborhood of 190° centigrade. The time of exposure to heat varied from three to four minutes. This is from one to two minutes shorter time than was given by the hotel and restaurant.

Clam Chowder. — To a chowder prepared in the ordinary way and which had been at the boiling temperature for ten minutes the soft parts of the clams were added and the whole boiled for three minutes. The time of exposure to heat was three minutes. Inasmuch as many restaurants and hotels prepare a chowder with the clams added, boil and then keep on a steam table, a second experiment was tried in which these conditions were simulated, the chowder containing the clams being boiled for fifteen minutes and then kept hot for forty minutes in a double boiler.

Oyster Stew. — The oysters after being washed were strained through cheese cloth, the liquor being reserved and heated to the boiling point. The oysters were then added and cooked until the edges began to curl and the oysters became plump (about one minute). They were then placed in the hot stew for about four minutes before being withdrawn.

Oysters Fried in Crumbs. — Oysters dried in cloth were seasoned, dipped in flour, egg and crumbs and then fried in deep fat. The temperature of the fat at the start was 220° centigrade, but a drop to 190° centigrade occurred when the oysters were added. The oysters were removed when brown, the time varying from one-half to one minute. This amount of cooking is less by about four minutes than what is usually given in some of the best restaurants and hotels. Further cooking at the high temperature of boiling fat would probably destroy all organism. (See results fried clams.)

Fancy Roast Oysters. — In cooking fancy roast oysters the oysters were cooked in a stew pan containing only a little liquor, being withdrawn as soon as the edges began to curl. The oysters are practically only heated through. The length of exposure to heat in this experiment varied from three to five minutes; the temperature to start with was that of the room, being raised rapidly to the boiling point.

Scalloped Oysters. — This dish was prepared from bread and cracker crumbs and butter in the ordinary way, using one layer of oysters only. The time of exposure to heat was twenty minutes, the average temperature of the oven being 250° centigrade.

Lobsters. — The lobsters used in the following experiments were obtained from a Boston dealer and had probably been kept in the lobster floats off the Atlantic avenue wharf for several days. To insure their being infected they were inoculated with both the sewage streptococcus and *B. coli* before being cooked.

Boiled Live Lobster. — A live lobster was plunged into boiling water and boiled for seventeen minutes. Portions of the claws, belly meat and intestines were removed and tested in the way previously described.

Broiled Live Lobster. — The lobster, split in the usual way and with the claws cracked, was broiled over live coals for fifteen minutes. Tests were then made as above.

Table No. I.

Showing Percentage Infection with Sewage Organisms of Control Samples of Clams, Oysters and Lobsters Used for the Experiments.

Lot Number.		Used for Experiments.	Total Per Cent. Showing Infection.	*B. Coli* Found.	Sewage Streptococcus Found.	Remarks.
1....	Clams	1, 4, 5	90%	20%	90%	Infected by keeping in 1 part sewage and 3 parts sea water for 2 days.
2 ...	Clams	2, 3, 6, 7	100%	60%	100%	Infected by keeping in 1 part sewage and 3 parts sea water for 2 days.
3....	Oysters	8, 9, 10, 11	80%	40%	40%	Infected by keeping in 1 part sewage and 3 parts sea water for 2 days.
4 ...	Lobsters......	....	......	......	....	Infected by injection of broth cultures of B. coli and sewage streptococci.

Table No. II. — Clams.

Experiment Number.		Time Exposed to Heat.	Average Temperature.	Total per cent. Showing Infection.	*B. Coli* Found.	Sewage Streptococci Found.
		Minutes.				
1....	Steamed clams............	3	100° C.	50%	20%	40%
2....	Steamed clams............	10	100° C.	40%	0%	40%
3....	Steamed clams............	15	100° C.	0%	0%	0%
4....	Clams fried in batter.....	3-4	190° C.	0%	0%	0%
5....	Clam chowder............	3	100° C.	10%	0%	10%
6....	Clam chowder............	15	100° C.	0%	0%	0%
7....	Clam chowder............	55*	about 90° C.	0%	0%	0%

* Forty minutes steaming in double boiler.

It is evident that three minutes, the shortest time that would ever be given steamed clams, is insufficient to render infected clams safe for ingestion. Ten minutes shows but a small amount of improvement, according to the table, but it should be stated that the clams used in this second experiment were more grossly polluted (see Table I.) than those used in experiment 1, and the types found were, according to Andrews and Horder,* more pathogenic. The clams steamed for fifteen minutes were not absolutely sterile, but contained no sewage organisms. With fried clams the high heat obtained in boiling fat was sufficient to sterilize the clams used in three to four minutes. As chowders are practically always kept hot for a considerable time after cooking, it may be safely said that danger from this source is but slight. It is interesting to note the difference in the results of three-minute exposures to 100° centigrade with and without the shell, as shown by the first and fifth experiments.

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* Lancet. Andrews and Horder, September 15, 22, 29, 1906.

Table No. III.—Oysters.

Experiment Number.		Time Exposed to Heat.	Average Temperature.	Total per cent. Showing Infection.	*B. Coli* Found.	Sewage Streptococci Found.
		Minutes.	*About.*			
8...	Oyster stew...............	4	75° C.	20%	10%	10%
9...	Oysters fried in crumbs..	½ to 1	190° C.	40%	0%	40%
10...	Oysters scalloped.........	20	250° C.	0%	0%	0%
11...	Oysters, fancy roast......	3 to 5	20°-100° C.	40%	10%	30%

Oyster stews, unlike clam chowders, are usually served to order. Thus they are unlikely to receive a long continued exposure to heat. Oysters fried in crumbs received only about one-third the exposure to heat that the clams received. It is probably true that this is frequently the case, the cook judging the length of time of cooking by the browning of the exterior, which takes place very rapidly with crumbs. The longer period of cooking is perhaps the more common. This idea was confirmed by two well-known hostelries.

Scalloped oysters are exposed to a high heat for a considerable period of time. No growth was obtained from plates inoculated with this material.

Fancy roast oysters receive very little real cooking. They are practically hardly heated through in the short time of exposure to heat. The temperature of the oysters when placed over the fire was that of the room. Thus the exposure to the boiling temperature was but for a very short period of time.

Table No. IV. — Lobsters.

Experiment Number.		Time Exposed to Heat.	Average Temperature.	Total per cent. Showing Infection.	*B. Coli* Found.	Sewage Streptococcus Found.
		Minutes.				
12...	Boiled live lobster..........	17	100° C.	0	0	0
13...	Broiled live lobster.........	15	?	0	0	0

It is evident from the above experiments that so far as intestinal organisms are concerned lobsters are perfectly safe to eat when either of the above methods is used. Lobster baked would probably receive fully as much heat for as great a length of time, while other methods of cooking or serving either require as great or greater heat or are prepared from boiled lobster.

Summary of Results.

1. A large majority of the clams and lobsters coming from Boston harbor are infected with sewage organisms.
2. The lobsters tested which came from outside of Massachusetts (Maine and Nova Scotia) were as a rule free from sewage organisms.
3. The clams tested, other than those from Boston harbor, were infected to some extent, but the percentage of infection was much smaller than those from Boston harbor.

4. The oysters tested were comparatively free from sewage organisms.

5. In the case of broiled or boiled live lobster, sewage organisms are killed and the lobster is sterile when taken from the fire.

6. By some of the more common processes of cooking, oysters and clams are not sterile when taken from the fire. Where delay occurs in serving, the additional amount of heat probably acts to render the infected shellfish harmless as far as infection is concerned, but when served immediately, as in first class hotels and restaurants, complete sterilization is not insured.* Especially is this true in the case of steamed clams, where the exposure to steam is often for so short a time that the heat does not have time to really penetrate to the intestines. With fancy roast oysters the time of exposure to heat is also insufficient and the temperature not high.

7. Steamed clams and clam chowder if cooked at least fifteen minutes are safe so far as infection is concerned. The same is true of clams fried in batter and scalloped oysters when cooked according to every-day recipes. Toxines might, however, remain unaffected.

Conclusions

Based on the above investigation and on previous investigations by this laboratory and other laboratories.

1. From experiments by Klein and others,† it is evident that shellfish do not normally contain either *Bacillus coli* or the sewage streptococcus (Houston), the presence of which is usually taken as an evidence of sewage pollution.

2. Shellfish become infected with these sewage organisms when grown in sewage polluted waters. Such sewage organisms disappear within a comparatively short time if the shellfish are subsequently kept in clean water.‡

3. The presence of *Bacillus coli* or the sewage streptococcus in any abundance in the intestines of the shellfish is good evidence of sewage pollution, and such shellfish are unfit for food owing to the possible and probable presence of organisms either pathogenic or capable of producing disturbances in the intestinal tract of man.

4. The practice of bringing oysters from deep layings

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* According to the best authorities, the shorter the time of cooking, the better the flavor of the shellfish.

† Klein. Report to Worshipful Company of Fishmongers, London, 1905, on the vitality of sewage microbes in oysters and other shellfish. Thirty-fourth Report, Massachusetts State Board of Health.

‡ Klein. Jour. of State Medicine, Vol. XII., No. 10, October, 1904.

and "plumping" in comparatively fresh water is probably responsible for much sickness, since the place chosen for such plumping is very apt to be near sources of pollution. *

5. Lobsters, being migratory, are often caught in sewage polluted waters. Since a high heat for a comparatively long length of time is necessary for proper cooking, the danger of infection from eating lobsters, even if taken from polluted water, is practically *nil.*

6. The areas from which clams were formerly dug in Boston harbor are grossly polluted with sewage. The use of such clams for food must be considered as dangerous, since complete sterilization by cooking cannot always be insured.

7. The amount of cooking usually given steamed clams † and fancy roast oysters is insufficient to kill sewage organisms. Shellfish thus cooked are dangerous when coming from polluted sources. ‡

It is a question whether shellfish taken from sewage polluted waters are safe articles of food, even if all infectious organisms are killed by cooking.

AN INVESTIGATION OF THE AMOUNT OF DANGER OF INFECTION FROM THE INDISCRIMINATE USE OF MOUTH-PIECES ATTACHED TO LUNG-TESTING MACHINES IN PENNY AMUSEMENT RESORTS.

Six different penny amusement places were visited, the mouthpieces of the lung-testing machines inspected and sterile swabs rubbed over the inner surfaces, twenty-four mouthpieces in all being tested. The results obtained were as follows:

1. No bacterial growth of any kind from eight brass mouthpieces.
2. Cultures of various species of harmless organisms from eleven brass mouthpieces.
3. Cultures producing slight lesions in guinea pigs from two brass mouthpieces.
4. Cultures producing marked lesions in guinea pigs (abscesses) from one brass and two rubber mouthpieces.

The only organisms found which could be classed as harmful were common pus-producing bacteria. Neither diphtheria bacilli nor tuberculosis organisms were found, although the work was laid out with the special object of finding these organisms if present.

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* See Annual Report, Boston Board of Health, 1900, page 87, 88. *Survival of typhoid bacilli in bodies of cooked shellfish.* See also *oyster culture in relation to disease.* Twenty-fourth Annual Report of the Local Government Board.

† See also Massachusetts State Board of Health Report, 1905, page 437.

‡ See also Annual Report Boston Board of Health, 1902, page 92.

Conclusions.

1. The metallic mouthpieces are so shaped that the lips do not actually come in contact with the inner portions of the cup, the metal striking the skin just beyond the lips.
2. The rubber mouthpieces were shallow cups of such a shape that the lips of the user would of necessity come in contact with any saliva deposited by the previous user.
3. The metal mouthpieces had a decided deleterious effect upon the vitality of the bacteria, while the rubber cups had evidently no inhibitory or other effect.
4. While the experimental evidence obtained was negative, it is obvious that persons following immediately after users carrying diphtheria or tuberculosis organisms, having syphilitic mouth lesions and the like, would be exposed to considerable danger of infection.
5. While the actual danger of infection is probably comparatively slight, a regular and systematic cleansing of the mouthpieces with a strong disinfectant would tend to reduce this danger to a minimum.

EFFECT OF AUTOMOBILE CYLINDER OIL ON ASPHALT PAVEMENTS.

At the suggestion of the Board, a few experiments were undertaken to determine the deleterious effect on asphalt of the oil dropped on the pavement from automobiles. The change in the pavement was noticeable only in front of garages, automobile stores or other places where the machines frequently stop or are left standing for any considerable length of time. At these places, particularly on Boylston street, between Exeter and Fairfield streets, the pavement within three feet of the curbing was much darker than the normal, was soft enough to take deep impressions of toe-calks, wheel-marks, etc., was easily flaked or cut with any steel instrument, and was covered with an oily, sticky layer of street dirt. Penetration tests with a steel needle driven by a falling weight proved conclusively the softening effect of the oil, the needle penetrating twice as far into the oily pavement as it did into the normal pavement. The disintegrating effect is undoubtedly due to the solvent action of oil on the hydrocarbons (bitumen) forming the basis of asphalt.

DISINFECTANTS.

Chemical Tests.

Nine unopened casks of chloride of lime at the North Grove street stables were sampled. The samples were mixed thoroughly, analyzed and found to contain 34.5 per cent. available chlorine.

Bacteriological Tests.

Three samples of commercial disinfectants were submitted to determine their efficiency as germicides, as follows:

Heraklite. — A dry, powdery material, of the general appearance of chloride of lime. Directions specified no particular amount to be used, but suggested that the dry powder be scattered about and used similar to chloride of lime.

Glass rods infected with diphtheria bacilli and *B. pyocyaneus* were exposed just above the powder, and also placed in the powder itself, for from one minute to three hours, twenty-four tests with each organism being made. No disinfecting action whatsoever was noticeable, growth occurring in every instance when the rods were inoculated on culture media.

A chemical analysis for available chlorine gave less than one per cent.

"*Miracle Disinfectant.*" — A dry, powdery material "to be sprinkled dry."

Tests were made exactly as described under Heraklite, with the exception that the time of exposure was extended to fifteen hours, fourteen tests being made with each organism. In no case did disinfection take place.

"*Crawford's La-Lo Spray.*" — This material consisted largely of a volatile mineral oil and contained no inorganic substances. Its specific gravity was .815, flash point 155° Fahrenheit, and fire test 165° Fahrenheit.

This material was tested as a liquid disinfectant by immersing glass rods injected with *B. diphtheria*, *B. pyocyaneus* and *B. anthracis*. In no case were the organisms killed after a three-hour exposure to the liquid.

In order to test its effect as a gaseous disinfectant seven times the amount suggested was sprayed, according to directions, into an enclosed space where infected rods were exposed.

No disinfecting action was noticeable.

BACTERIOLOGICAL EXAMINATION OF ICE CREAM AND HOKEY POKEY.

During the last two weeks of August samples of ice cream and hokey pokey were seized from carts and stores in various parts of the city and brought to the laboratory for examination. At the time the samples were seized inspections were made by Chief Inspector Thomas Jordan of the places where the creams were manufactured.

A count was made of the number of bacteria per cubic centimeter in each of the samples.

Table Summarizing Bacterial Counts on Ice Cream.

	Bacteria per Cubic Centimeter.
Total average	23,000,000
Average for stores (26)	25,000,000
Average for carts (5)	28,000,000
Average for stands (4)	9,000,000
Highest count	150,000,000
Lowest count	1,000,000

Many samples showed indications of the presence of starch or of the use of condensed skim milk, these samples as a rule being lower in bacterial content than samples evidently made from whole milk or cream. Besides the condition of the place where the cream is made, it is evident that the amount of cooking the cream receives, the condition of the materials used, the constancy and degree of cold and the like, all must have a considerable effect on the number of bacteria found in the product. The practice of mixing the left-over cream of one day with a fresh lot of material must tend to give a high bacterial count, since the fresh lot is seeded with organisms best adapted to stand comparatively low temperatures.

DRAWN VERSUS UNDRAWN FOWL.

The experiments begun last year have been continued. Drawn, partially or wire drawn, and wholly drawn fowl, which had been kept frozen for ten months in cold storage were placed in the laboratory ice chest for two days, withdrawn and hung up in the room until considerable putrefaction was manifest. Of two separate lots treated in this manner, the wholly drawn bird gave off a distinctly sour odor after one day at room temperature, was distinctly discolored and gave off considerable odor after two days. The wire drawn fowl became sour after two days and discolored after three days, while the undrawn fowl remained sweet for nearly four days.

It seems evident that in the operation of drawing, either partially or wholly, portions of the contents of the intestines are spilled inside the abdominal cavity, thus seeding the interior with bacteria and hastening putrefaction once the fowl are brought above freezing. There was no evidence whatsoever of the presence of ptomaines when the fowl were first taken from storage.

BACTERIOLOGICAL TESTS ON DRINKING WATER.

At the request of Commissioner Hayes, a sample of the city water drawn from one of the laboratory taps was tested on August 8 and 10. Forty-eight hour counts showed the water to contain less than 200 bacteria to the cubic centimeter. Tests for sewage organisms showed the water to be free from contamination.

MISCELLANEOUS TESTS.

In addition to the above, inspections and special tests were made and reported on as follows:

Analysis of two samples of wallpaper for the presence of arsenic; results negative.

Analysis of candy and pasteboard whistle containers, for arsenic or other poisonous coloring matter; results negative.

Analysis of one sample of meat, two of sausage and two of oysters for preservatives; results negative.

A sample of custard pie bought at a bakery, having turned a bright red color, was submitted to the laboratory by the purchaser. The organism causing this red color was found to be *B. Prodigiosus.*

All of which is respectfully submitted.

BURT RANSOM RICKARDS, S.B.,
Director.

REPORT OF MILK INSPECTOR.

BUREAU OF MILK INSPECTION,
30 HUNTINGTON AVENUE, BOSTON, MASS.

To the Board of Health:

GENTLEMEN, — I have the honor to submit the following report for the year ending January 31, 1907:

The total number of samples collected and examined was 19,453, as follows:

Number of samples of milk from wagons	6,808
Number of samples of milk from stores	5,581
Number of samples brought in by citizens	237
Number of samples of milk (bacteriological)	5,007
Total milk samples	17,633
Number of samples of vinegar	1,146
Number of samples of butter, cheese and oleomargarine,	674
Total samples	19,453

The problem of furnishing milk to a large city is of considerable magnitude, and one in which, under prevailing conditions, the difficulties are increasing yearly. Formerly shortage periods in the milk supply were infrequent, usually occurring in summer only after an extended period of high temperature and drought, or in winter from the occasional blockading of the railroads by snow. In former years, also, the contractors carried a much larger surplus than is now the custom, and were thus better equipped to meet emergency demands. With a smaller surplus it naturally follows that the available supply is more easily exhausted, and that shortages are not uncommon. This condition has confronted the trade in several instances during the last year, and on more than one of these occasions extra milk has commanded more than the normal price, so great was the desire of milkmen to secure enough to serve their customers. During these shortage periods milk is brought to this city from temporary sources of supply, usually from more remote points, and the supplies of other cities are sometimes utilized. Much of this milk is wanted immediately, and on arrival is rushed from the cars to customers without the usual inspection or mixing to secure uniformity of product. It is to be expected under these circumstances that quality suffers; and as a matter of fact on more than one occasion this extra milk has been diluted with water by those sending it to this city. A considerable proportion of the samples of low standard collected during the year were of specimens secured while the ordinary supply was inadequate to meet the demand. Another contributing cause to the number of samples falling below the standard for milk solids is from lax or intentional methods of handling in shops whereby cream is removed, resulting in the impoverishment of the balance of the milk. Although attention has previously been directed to the necessity of giving each customer his share of cream by mixing the milk before each sale, and to the danger of "pouring off" even "a little from the top of the can" for any one of the variety of excuses offered, constant repetition of the warning is necessary in order to have the desired methods and care prevail. In at least one instance the cause assigned for the poor quality of the milk was the use of a tank which had a faucet near the bottom as a holder for the milk on sale. This is an antiquated and dangerous device, and its use should be abandoned; for by its employment, if the milk remains in the tank for any length of time without mixing, the portions of milk drawn off before the cream line nears the faucet level will be deficient in fat to a varying extent. In the large shops milk is usually sold from top-covered dip-tanks. These are not unlike ice chests in outward appearance, and so arranged that the milk container, which is of tin and in the centre, can be easily surrounded with ice. With these tanks, the tin milk holders, being of varying capacities, long-handled dippers are employed for measuring, and with these a careless operator can hardly avoid mixing the milk to some extent, while with ordinary care a proper cream distribution can be easily obtained.

In the endeavor to secure an adequate supply of milk for this city a growing tendency is noted to open up new fields for providing milk by going further into the country. This acquirement of new sources of supply, although not rapid, is proceeding as speedily as circumstances demand. That has been the experience in this city, where a portion of the milk now comes from a distance of 208 miles. This haul shows an increase in distance over that of ten years ago, for the milk sold by the same firm, of over thirty-one per cent. Boston is not alone in this situation, as it is the experience of other cities, one of which has a portion of its milk supply brought a distance of 400 miles. At first glance remote territory appears to indicate a staler milk supply, but within certain limits of distance this supposition is erroneous, because with the methods in vogue at present, whereby a large portion of the milk which arrives one day is not delivered until the following day, the milk if well iced while upon the cars suffers no greater change than it would while being held in this city awaiting delivery, *i.e.*, assuming that the milk was of the same age as that from near-by sources. Boston's milk supply outside Massachusetts is drawn from New Hampshire, Vermont, Connecticut, Maine and New York.

Fresh milk being a desideratum, the age of this fluid is always an important factor; and although not all of the milk is delivered by contractors to consumers, the age of that furnished by these concerns is of interest. During the summer months one firm claims to supply its customers with milk twelve hours old; and another concern delivers milk to a portion of its patrons throughout the summer months of the same age, while the balance of its customers receive their milk when it is twenty-four hours old. Another firm in winter serves one-half of its family trade with milk twelve hours old, while the remaining retail customers are given milk twenty-four hours old. The greater portion of the milk delivered by contracting firms is from twenty-four to thirty-six hours old; a portion of the milk supply of one large firm is forty-eight hours old. Another large concern supplies milk to ten per cent. of its stores and restaurants which is from forty-eight to sixty hours old. Milk of forty-eight to sixty hours old, to be of good quality, must have been produced and kept under ideal conditions.

Of the 368,849 quarts of milk which comes to Boston daily, 325,261 quarts, or 88.18 per cent., arrives by railroads; 39,007 quarts, or 10.58 per cent., is transported to this city by means of wagons, and is obtained from farms in adjoining towns; and the 539 cows within the limits of the city produce 4,581 quarts, or 1.24 per cent. By comparison with the amount of railroad milk for 1905, the present year indicates an increase of one per cent.

Not all of the milk which is brought in by railroads is used in this city, much of it being consumed in the cities and towns surrounding Boston. A careful compilation, however, of the data obtainable from contractors and milkmen indicates that Boston's daily per capita consumption of milk, based upon the estimated population for 1906, was 13.3 ounces, a trifle over eight-tenths of a pint. (Actually, however, less than this amount was used by each individual, for much milk is consumed at restaurants and hotels by non-residents.)

Modern methods appear to indicate the ultimate elimination of the 8½-quart can for transporting milk to Boston by railroads. This size was for many years exclusively employed for this purpose, but is being gradually supplanted by cans of larger capacities, dealers being of the opinion that by use of the new units, milk may be brought here in much better condition and that the large cans may be handled with greater facility. At present 63 per cent. of the railroad milk arrives in 8½-quart cans; 27 per cent. in 21¼-quart cans; 9 per cent. in 40-quart cans, and 1 per cent. in 20 and 30-quart cans.

The concentration in the milk traffic is constantly increasing. This is well illustrated by the rapidly lessening number of milkmen. At this time there are only 316 licensed dealers, a loss of 28 licenses over the preceding year. This naturally means more business for the remaining milkmen. The number of shops selling milk shows an increase of 117 over 1905; 3,746 shops are now engaged in the sale of milk in this city.

A marked change for the better is to be noted in the condition of milk cans which are returned to the producer by the contractor. Formerly no attempt was made to clean these cans, and many of them reached the farmer in a deplorable condition. Now, however, fully 87.5 per cent. are being washed before they are sent to the farmer. This washing does not relieve the producer of responsibility as to the condition of the cans. Before filling, each can should be examined, and if found to need further washing or scalding with boiling water, this should be done before the can is used. In the washing of cans one firm employs a method which involves, first, the use of cold rinsing water in the previously inverted can; this is followed by streams of hot water; next, powerful jets of hot alkaline water, followed by streams of clean hot water; next, jets of steam; and, lastly, jets of hot water to remove the steam. The manipulation employed by the other firms involves their being brushed with hot soapy water, after being in some instances first rinsed in cold water. The soapy water is removed by rinsing, and the cans in all instances are treated with live steam. Four of the contracting firms wash all of the returned cans; one firm washes one-half of its cans; another all but 200 cans; and one firm washes cans for only those producers who desire the cans cleaned.

In addition to the cleaning of cans by contractors, an attempt has been made to stop the use of milk vessels, which had become much too common, as containers for foreign substances. In times past milk cans have been used for swill, and for other products not of a milk-like nature, and equally disgusting. Their general employment for such purposes has fortunately lessened to a marked degree, but to a certain extent the impression still prevails that milk cans are available for public use, with a variety of substances. To eradicate this idea, copies of the law relating to the misuse of cans were mailed early in the summer to every licensed and registered milk dealer in the city. This had a marked effect in lessening the evil, but the subject still demands attention. Within a few months milk cans were found in different sections of the city in use as containers of broken eggs, coffee, olive oil, chocolate, blood, molasses, kerosene oil, and for heating water in lunch carts and bake-shops. One specimen found in a bake-shop, and used for the latter purpose, had upon the outside an accumulation of baked and carbonized dough of unsightly appearance. Milk cans are utilized more frequently as holders for kerosene oil than for any other substance. Such latter use is not to be considered as unsanitary; the removal of the odor of this fluid is a difficult task, however, but unless this is done before the cans are again employed for milk, the latter will have a disagreeable taint. In some instances of misuse of cans warning notices have been issued to the offenders; but in the case where a milk can was used for blood, an object lesson was deemed advisable, and action was brought under the regulation of the Boston Board of Health prohibiting the use of milk cans as containers for substances other than milk. After trial the defendant was found guilty and fined $10. The firm which placed the blood in the milk can has since purchased cans for the sale of blood, and upon each can appears this notice: "This can has been and will be used exclusively for blood."

The section of the law on misuse of milk cans applicable to milkmen, and which aims to prevent distribution of milk in receptacles belonging to another firm or corporation, has also been given attention. The object of this provision is to prevent the milk cans which are to be sent to the country from being kept about the city in shops, where they are not only likely to be used for other purposes, but in the warm weather the milk drainings sour and oftentimes putrefy with disagreeable results. In no event does this increase the cleanliness of the milk supply, and if the cans are returned to the producer in a foul condition the cleansing is difficult and an unnecessary hardship, and furthermore is far removed from an object lesson in cleanliness. With the milkman using his own cans for the distribution of milk about the city, more care is used in their prompt collection and the chances of misuse of cans or temperature changes in milk drainings reduced to a minimum. A great gain from the sanitary standpoint comes from the fact that the cans containing milk delivered by contractors to milkmen are returned to the former on the day following their receipt, when the task of cleansing is less difficult than where the cans are left about the shops supplied by milkmen for an indefinite period.

One case was brought for distributing milk about the city in cans which did not bear the name of the defendant milkman. In the lower courts he was found guilty and fined $10. He appealed; later the amount of the fine was paid.

Nearly all of the milk supplied to the retail trade is delivered in glass bottles, and they are to a large extend demanded by customers. Probably not one per cent. of the containers used for retail delivery are of tin, but from many standpoints cans have advantages over glass. The only factor in favor of the glass bottle is that the customer is enabled to see whether or not it was thoroughly cleaned when washed. The almost universal adoption of glass, however, was not determined by this fact, but from the supposition that the presence of dirt in milk would be readily disclosed by this means. It is true that insoluble dirt in milk is manifested by the accumulated deposit in the bottom of the bottle, and while the presence of such matter in milk is uninviting to the palate, it is the cleanest portion of the filth, for it represents the insoluble or washed dirt, while the most harmful, the soluble part, remains in solution. But this latter is not usually a cause of complaint from the customer, because he is unaware of its presence. With a large percentage of the milk the absence of a deposit in the bottom of the bottle does not indicate clean milk in the fullest sense of the term; it is merely a tribute to the device employed by the dealer in removing these insoluble substances by straining, and which are in most instances in contact with the milk for a considerable period; *i.e.*, from the time it leaves the farm until received in the city by the milkman. This straining does not, as before indicated, eliminate the washings of the dirt, a hidden danger of pronounced type, but inoffensive to the eye. Thus it is seen that the bottling of milk never was and never will be an insurance against filth.

Very few of the milk bottles are of a larger capacity than one quart, this size having been found more practical by the trade, and supplanting the larger sizes formerly employed. From the dealers' standpoint there are disadvantages in the use of glass bottles. Without doubt they increase the cost of delivery, for they are heavier than cans, consequently it is impossible to transport as many upon a wagon or for a man to deliver as many upon a "foot-beat," *i.e.*, the transportation of retail milk in baskets between the delivery wagon and the householder. The expense from the breakage of bottles is heavy, and unless well made they are not as adaptable to sterilization as cans. The loss from theft is about equalized between the two kinds of containers, and in either case this is not an insignificant item for the expense account.

Milk cans have some advantages over bottles. The former are readily sterilized; from the consideration of lightness, larger loads can be transported both by wagons and man; in addition, the cost is less, all of which means economy in delivery of milk. Furthermore, there is no reason why a can should not be made as clean as a bottle, and the fact must not be forgotten that a large percentage of the milk sold in bottles is transported from the place of production to the city in cans. In the hands of the dealer can milk is quickly transformed into bottled milk, and the consumer is unmindful, even if he was ever aware of the possibility, of the same milk having been previously in a tin can. Oftentimes this strained bottled milk, so pleasing to the eye, remains in tin cans for a much longer time than it does in glass bottles. Thus the use of milk bottles is a whim founded on fallacy, but nevertheless pleasing to the public.

About 123,250 quarts of Boston's milk supply is subjected to commercial pasteurization daily, and of this amount not over 29,750 quarts go directly to the retail trade. Commercial pasteurization means the heating of milk to varying temperature, usually from 155° to 170° Fahrenheit, for a short time, usually a matter of seconds, and then suddenly cooling. The time for the application of heat is never prolonged, as is usually the practice in household pasteurization. Commercial pasteurization serves a purpose, but it is not true pasteurization. Undoubtedly nearly all of the souring bacteria are destroyed under this treatment, but the more deleterious bacteria are not killed, and these may produce harmful changes in this type of milk while it still appears sweet and palatable. Oftentimes this pasteurization means that filthy milk which would under ordinary conditions be unsalable because of souring, is given a new lease of life and becomes a marketable commodity. It can never be associated with progressive dairying, as it puts a premium upon careless and filthy production and handling of milk. The necessary incentive for cleanliness is lacking. Commercial pasteurized milk is at present sold as raw milk, but this custom should be regulated by labelling this product so as to indicate its true character. Those who want this kind of milk could offer no objection, and those who do not desire it should not have it forced upon them through ignorance of its nature.

One of the contracting firms purchases one-half of its supply from the farmers upon a fat basis, paying an extra price for all milk testing over 4 per cent. of fat. Another firm buys all of its milk upon a fat test. According to the plan of this concern a standard price is allowed producers for milk containing from 3.6 per cent. to 4 per cent. of fat. For all milk testing above 4 per cent. and not above 4.2 per cent. of fat, a premium of one cent per can is paid. For milk testing above 4.2 per cent. and not above 4.4 per cent. of fat, a premium of two cents per can is paid. For milk testing above 4.4 per cent. of fat, a premium of three cents per can is allowed. If milk falls below 3.6 per cent. of fat, the price is decreased one cent per can for every two-tenths below 3.6 per cent. Milk falling below 3 per cent. of fat is not accepted. This idea is not an experiment, but has been in operation for a sufficient time to demonstrate its practicability. It has proven acceptable to both contractor and farmer.

The bacteriological examination has been continued and improvement in the quality of milk found at the contractors' cars is noted. This is evidence that the campaign of education for greater care in the production and handling of milk, although a task of large magnitude, is slowly bearing fruit. The results are surprising in view of the fact that 1906 was exceptional from the standpoint of an insufficient ice crop and many producers were without means to properly cool their milk during the warm months of the year. In all, 864 warnings were issued upon samples containing an excess of bacteria or streptococci, pus and streptococci, or pus; of these 272 were sent to contractors and by the latter were immediately forwarded to the producer.

Table I. indicates the character of the milk taken from contractors. By this it is seen that 89.98 per cent. of the samples were within the limitation of 500,000 bacteria per cubic centimeter of the Boston Board of Health, while only 10.02 per cent. exceeded this number. No doubt at many of the farms responsible for this latter grade of milk the conditions were such as to render the production of milk of even fair quality impossible. Thus it is seen that further modification is necessary to bring a portion of the milk as it arrives from the farm within the prescribed limits. Comparison with the figures for 1905 denotes the improvement. During that period 87.6 per cent. of the samples from contractors were found with 500,000 or less bacteria per cubic centimeter, while 12.4 per cent. contained over 500,000 bacteria. It is of interest also to note that 62.33 per cent. of the samples during 1906 were under 50,000 bacteria and 20.34 per cent. contained between 50,000 and 100,000 bacteria to the cubic centimeter. Thus it is seen that 82.67 per cent. of the contractors' samples were with less than 100,000 bacteria to the cubic centimeter. By eliminating the specimens above 100,000 bacteria per cubic centimeter, 17.33 per cent. as shown by these examinations, it is readily seen that it is not an impossibility to provide a milk supply of vastly improved quality. With such a supply, combined with ideal conditions of handling after arrival, including quick deliveries to consumers, little difficulty would be experienced in complying with the regulations of the Board. In 1905, 59.8 per cent. of the specimens from contractors were under 50,000 bacteria to the cubic centimeter, and 15.1 per cent. contained between 50,000 and 100,000. For that year 74.9 per cent. of the samples were under 100,000 bacteria to the cubic centimeter. Thus the comparative figure of 82.67 per cent. for 1906 shows a marked betterment, and especially with the milk samples having 50,000 to 100,000 bacteria to the cubic centimeter.

Table I. — Bacteriological Examination of Milk Samples from Contractors. Taken from Cars on Arrival.

Bacteria per Cubic Centimeter.	Number.	Per Cent.
Under 50,000	2,337	62.33
50,000 to 100,000	762	20.34
100,000 to 200,000	94	2.51
200,000 to 300,000	57	1.52
300,000 to 400,000	39	1.04
400,000 to 500,000	83	2.24
Total under 500,000	**3,372**	**89.98**
500,000 to 600,000	32	0.85
600,000 to 1,000,000	100	2.57
1,000,000 to 3,000,000	127	3.39
3,000,000 to 5,000,000	32	0.85
5,000,000 to 10,000,000	38	1.02
Above 10,000,000	50	1.34
Total, above 500,000	**379**	**10.02**
Total	**3,751**	**100.00**

Table II. — Bacteriological Examination of Milk Samples from Individual Contractors. These Specimens Considered Collectively in Preceding Table.

BACTERIA PER CUBIC CENTIMETER.	A		B		C		D		E		F		G	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Under 50,000	141	65.0	261	62.7	522	62.5	336	56.3	342	68.9	320	58.8	415	64.4
50,000 to 100,000	47	21.7	86	20.7	180	21.6	110	18.4	106	21.3	103	18.9	130	20.2
100,000 to 200,000	4	1.8	11	2.7	14	1.7	22	3.7	6	1.2	25	4.6	12	1.9
200,000 to 300,000	1	0.5	3	0.7	15	1.8	11	1.8	5	1.0	12	2.2	10	1.4
300,000 to 400,000	3	1.3	3	0.7	6	0.7	8	1.3	2	0.4	9	1.7	8	1.1
400,000 to 500,000	11	5.1	5	1.2	20	2.4	14	2.4	9	1.7	11	2.0	13	2.2
500,000 to 600,000	2	0.9	6	1.4	9	1.1	5	0.8	2	0.4	4	0.7	4	0.6
600,000 to 1,000,000	3	1.4	10	2.4	23	2.7	22	3.7	7	1.3	19	3.5	16	2.5
1,000,000 to 3,000,000	4	1.8	17	4.1	28	3.3	27	4.7	11	2.2	20	3.7	20	3.1
3,000,000 to 5,000,000	1	0.5	1	0.2	5	0.6	11	1.8	3	0.6	5	0.9	6	1.0
5,000,000 to 10,000,000	......	......	4	1.0	9	1.1	17	2.7	2	0.4	3	0.6	3	0.5
Above 10,000,000	......	......	9	2.2	4	0.5	14	2.4	3	0.6	13	2.4	7	1.1
Total under 500,000	207	95.4	369	88.7	757	90.7	501	83.9	470	94.5	480	88.2	588	91.2
Total above 500,000	10	4.6	47	11.3	78	9.3	96	16.1	28	5.5	64	11.8	56	8.8
Total	217	100	416	100	835	100	597	100	498	100	544	100	644	100

Table II. is devoted to the results of the bacteriological examination of the specimens obtained from each firm of contractors. These figures show an improvement, only one concern being below its standing of the preceding year. This firm, "B," and one other, "G," had a smaller percentage of milk below 50,000 bacteria to the cubic centimeter than in 1905 ; all of the remaining concerns made encouraging gains over the percentages of 1905. With the specimens between 50,000 and 100,000 bacteria per cubic centimeter, each firm made a marked improvement over the previous year.

Chart I. presents graphically the comparative bacteriological standing of the contracting firms for 1905 and 1906, and in addition shows the percentage of infected milk from these concerns for the same years. Each supply, it will be noted, indicates a marked diminution during 1906 over 1905 in the quantity of infected samples, and, with only one exception ("B"), an increase in the percentage of samples complying with the bacteriological standard.

The tables devoted to wagon and store samples are of interest, especially when considered in conjunction with Tables I. and II., those showing the condition of milk from contractors. The specimens from wagons and stores give an idea of the deterioration of milk by the prevailing conditions between its arrival in this city and subsequent delivery to consumers and sale in shops. These results are to a certain extent due to shortage of the 1906 ice crop and the consequent influence of high temperature upon bacterial growth. This element and the age of the milk when obtained from wagons and shops cannot fail to yield a product heavily charged with bacteria.

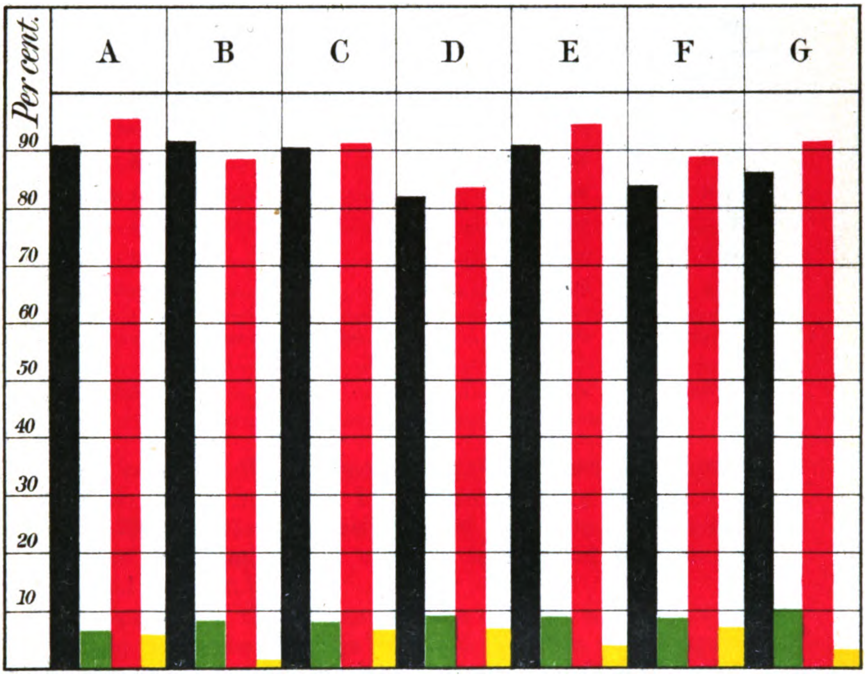
By Table III., devoted to wagon samples, it appears that 52.21 per cent. of the specimens were within the standard and that 47.99 contained over 500,000 bacteria to the cubic centimeter, while 16.74 per cent. only were under 50,000 bacteria per cubic centimeter. The examination of wagon samples in 1905 showed 54.4 per cent. complying with the standard, 45.6 per cent. in excess, and 18 per cent. with less than 50,000 to the cubic centimeter.

CHART No. 1

Individual Contractors' Samples

1905-1906

Percentages of specimens under 500,000 bacteria
to the c. c., and of infected milk



Percentage of Milk under 500,000 bacteria, 1905 ■
" " Infected Milk, 1905 . . . . . ■
" " Milk under 500,000 bacteria, 1906 ■
" " Infected Milk, 1906 . . . . .

Table III.—Bacteriological Examination of Milk Samples from Wagons.

BACTERIA PER CUBIC CENTIMETER.	Number.	Per Cent.
Under 50,000	108	16.74
50,000 to 100,000	58	8.99
100,000 to 200,000	59	9.15
200,000 to 300,000	38	6.00
300,000 to 400,000	29	4.51
400,000 to 500,000	44	6.82
Total wagon samples under 500,000	**336**	**52.21**
500,000 to 600,000	22	3.27
600,000 to 1,000,000	98	15.20
1,000,000 to 3,000,000	93	14.42
3,000,000 to 5,000,000	37	5.74
5,000,000 to 10,000,000	33	5.12
Above 10,000,000	26	4.04
Total wagon samples above 500,000	**309**	**47.99**
Total	**645**	**100.00**

The influence of age, repeated handlings and high temperature is shown in Table IV. That a large proportion of this milk was stale, or had spoiled by reason of improper methods surrounding its care, is manifested by the high bacterial content.

The results of these examinations of store samples in conjunction with the findings in 1905 indicate the danger of employing shop milk for feeding infants. The majority of these samples are totally unfit for this purpose, and the use of such milk can only be attended with great danger. Only 18.99 per cent. of these samples complied with the regulation, and 81.01 per cent. were in excess. Of this latter number, 84.29 per cent. were found to have over 1,000,000 bacteria to the cubic centimeter. Only 3.14 per cent. of the store samples were under 50,000 bacteria to the c. c. In 1905, 28.5 per cent. of the store samples were within the standard; 71.5 per cent. exceeded it and 21.9 per cent. were under 50,000 bacteria to the c. c.

Table IV. — Bacteriological Examination of Milk Samples from Stores.

BACTERIA PER CUBIC CENTIMETER.	Number.	Per Cent.
Under 50,000	14	3.14
50,000 to 100,000	5	1.12
100,000 to 200,000	22	5.04
200,000 to 300,000	13	2.94
300,000 to 400,000	13	2.94
400,000 to 500,000	17	3.81
Total store samples under 500,000	**84**	**18.99**
500,000 to 600,000	9	2.02
600,000 to 1,000,000	48	10.70
1,000,000 to 3,000,000	111	24.03
3,000,000 to 5,000,000	53	11.90
5,000,000 to 10,000,000	60	14.46
Above 10,000,000	80	17.90
Total store samples above 500,000	**361**	**81.01**
Total	**445**	**100.00**

The special samples, Table V., were from various sources, and were brought to the Bureau in many instances by citizens for examination. Some of the specimens were not iced, and very few came in sterilized containers. Under this classification 72.5 per cent. were under 500,000 bacteria, and 27.5 per cent. were above that figure; 42.5 per cent. were under 50,000 bacteria to each cubic centimeter.

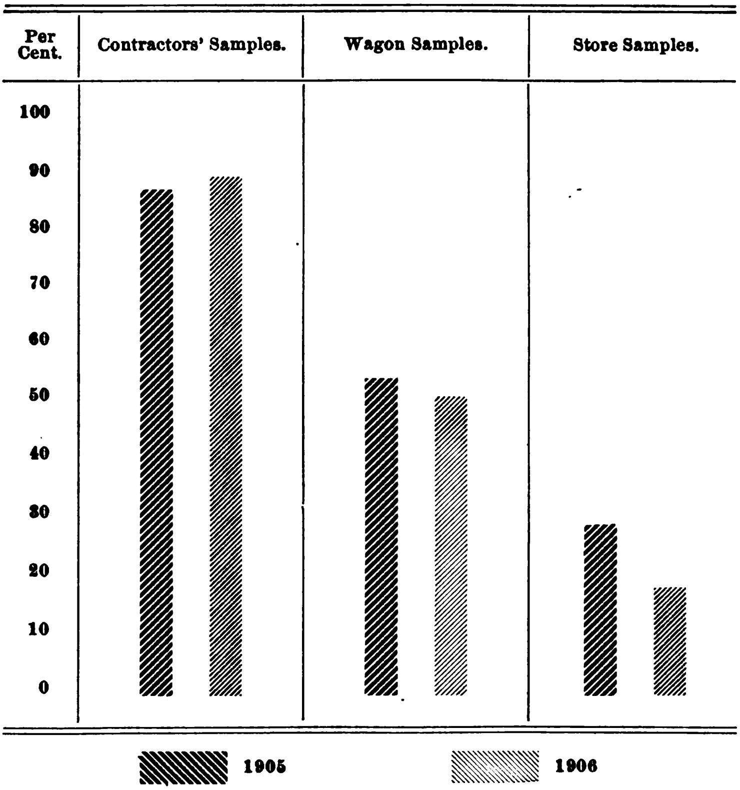
Table V. — Bacteriological Examination of Special Milk Samples.

BACTERIA PER CUBIC CENTIMETER.	Number.	Per Cent.
Under 50,000	34	42.50
50,000 to 100,000	11	13.75
100,000 to 200,000	4	5.00
200,000 to 300,000	2	2.50
300,000 to 400,000	3	3.75
400,000 to 500,000	4	5.00
Total special samples under 500,000	**58**	**72.50**
600,000 to 1,000,000	4	5.00
1,000,000 to 3,000,000	4	5.00
3,000,000 to 5,000,000	4	5.00
5,000,000 to 10,000,000	3	3.75
Above 10,000,000	7	8.75
Total special samples above 500,000	**22**	**27.50**
Total	**80**	**100.00**

The percentage of samples from contractors, wagons and stores, complying with the Board's regulation for 1905 and

1906, is indicated by the diagram which appears below. The contractors' samples show the condition of the milk as it arrives from the country; the wagon samples the milk as it is being delivered in the early morning hours of the following day, and the store milk is for the greater part that on sale in shops in the forenoon of the day following its receipt in this city.

Under contractors' samples an improvement for 1906 is noted, but the proportion of wagon samples conforming to the standard in 1906 is slightly less than in 1905; and under store samples 1906 shows a marked diminution of standard specimens when compared with those examined in 1905.



There was a pronounced decrease in the lessening of the quantity of infected milk. Of the 5,007 samples subjected to bacteriological examination, only 246, or 4.9 per cent., were reported for their pus, pus and streptococci, or streptococci content. By comparison with 1905 the improvement is noted. In that year, of 5,559 samples examined, 583, or 10.48 per cent., were found to be contaminated. Table VI. gives the details of the findings for 1906 by months:

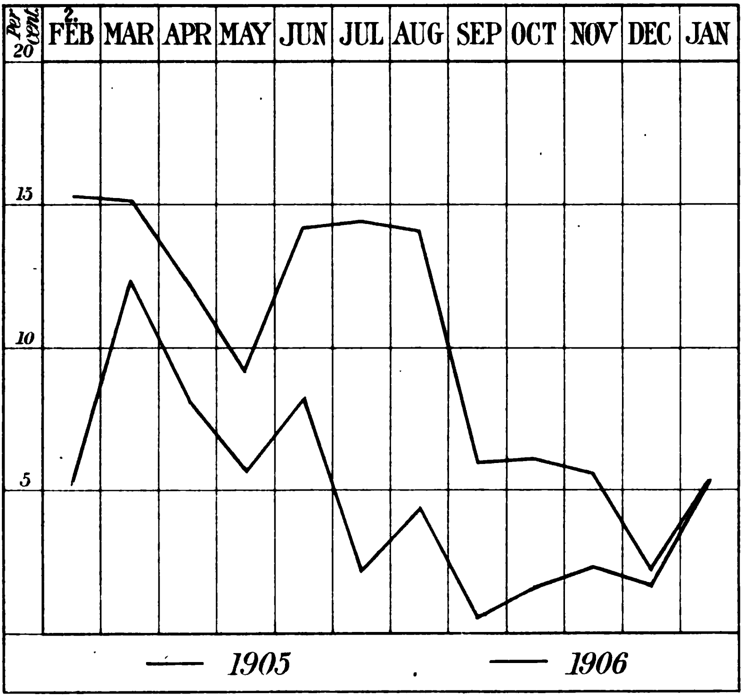
Table VI.

MONTH.	Total samples examined.	Number containing pus.	Number containing pus and streptococci.	Number containing streptococci.	Per cent. of milk infected.
February, 1906	458	12	1	11	5.3
March	479	41	8	10	12.3
April	543	22	20	2	8.1
May	263	1	....	14	5.7
June	248	1	....	19	8.2
July	227	1	....	4	2.2
August	435	15	2	2	4.4
September	353	....	....	2	0.6
October	554	1	....	8	1.6
November	423	2	....	8	2.3
December	422	1	....	6	1.6
January, 1907	607	3	....	29	5.3
Total	5,007	100	31	115	

The comparative percentage of infected milk for 1905 and 1906 is shown by the diagram, which appears opposite. This demonstrates the lessening of these contaminated specimens during the latter year, January (1907) being the only month in which no improvement was shown, the percentage of that month and of the January of the preceding year being alike.

This decrease in percentage of infected milk is gratifying, and no doubt attributable to the persistent exclusion of milk of this character from that permitted to enter the city. This result has not been attained without grumbling and protest, but as none of the objectors have been willing to admit that they would knowingly consume milk thus infected, but little value could be attached to the protestations. In any event, infected milk is an unfit food, and there is no doubt that it may produce disturbances in those who consume it. Consequently no effort should be spared to eliminate the product of gargety or otherwise diseased cows from the milk supplied to the public.

CHART No. 2



1. See Chart No. 1 for percentage of infected milk for 1905 and 1906 from Contractors only.
2. The official year begins February 1.

M10b

Reports upon the samples in which pus and streptococci were found were sent to those from whom the samples were obtained. A large percentage of these warnings were issued to contractors and by them forwarded to producers in the country. In addition, where these infected milks were procured from the contractor, the latter was immediately notified to stop bringing the product of these dairies to this city until the source of the trouble was located and eliminated. This notification in most instances has met with cheerful compliance, and the Bureau has been given the benefit of the procurable information as to the reason for the infection. These facts are of assistance in the endeavor to lessen the proportion of these samples sent to market, and because of this there should be an earnest endeavor in each case to discover the true state of affairs. By reason of the fact, however, that a few farmers, whose infected product has been temporarily excluded, have subsequently refused to resume sending their supply to this city, there has been to some extent a lack of hearty co-operation in ascertaining the cause of infection. After milk has been reported infected dependence solely upon producers to report the cause of the trouble, even where the reason was apparent beforehand, will not suffice. A thorough and competent examination is necessary in each instance. With a full knowledge of all of the circumstances this subject of infected milk can be adjusted to the satisfaction of both producer and contractor. On the contrary, an incomplete or half-hearted effort begets unwarranted dissatisfaction and discontent. Neither is the alleged reason that producers are disgruntled because infected products are excluded from this market an effectual argument. Better that producers should undergo slight financial loss and mental irritation than that unfortunate users of diseased milk should run the risk of endangering their physical welfare. But this alleged dissatisfaction has been found to a great extent lacking in the few cases where a discussion of the circumstances with producers was possible at this Bureau.

In many instances where pus was indicated it was found that the milk was from cows approaching or just subsequent to the calving period. To lessen the number of such samples, upon the suggestion of this Bureau, copies of the Regulation of the Boston Board of Health were sent by contractors to the farmers supplying milk to this city. Nearly 5,000 copies were so distributed. This regulation prohibits the use of milk for "fifteen days before and for five days after parturition."

A noxious and frequently occurring type of bacteria in milk is the streptococcus. The presence of this pyogenic organism is evidence of garget or mammitis as a pathological condition. This is a common bovine disease. Milk thus contaminated indicates infection in many instances. Animals so diseased should be separated from the herd and their milk destroyed until there is a return to normal conditions. Strong evidence is available that streptococci produce disturbances not only in infants, but with adults as well, and thus the necessity of excluding such samples is apparent.

An attempt has been made to procure information concerning each case of infection in milk, but reliance in most instances has to be placed upon the contractor, at present the only available channel for information. In some instances a praiseworthy and satisfactory effort was made, but it is desired that the contracting firms give the Bureau earnest and efficient aid in investigating each case.

The causes assigned where milk was found infected appear below. These results in conjunction with those given in the report of last year should convince the most skeptical of the necessity and value of this work. They show also, in instances much too frequent, a lack of care in keeping the milk of animals of apparent abnormal condition from the market supply.

The list follows:

1. Cow had a sliver in one teat; milk from the other quarters was being sent to market.
2. Cow recently calved.
3. Two cows nearly dry.
4. Cow with one quarter of udder badly swollen. Producer claimed that this milk was not being used; undoubtedly some of it was in the mixed supply.
5. Cow fresh from calf.
6. Two gargety cows.
7. Drying off two cows.
8. Cow with several sores on teats.
9. Five cows being dried off.
10. Cow with one quarter of bag caked and swollen.
11. Drying up three cows.
12. Cow with garget.
13. Cow recently calved.
14. Cow with sore teats; probably the stripping was not thorough.
15. Two cows approaching the calving period.
16. Cow with sore teat.
17. Sick cow. Farmer told the milk dealer he knew the milk was "not right."
18. Cow approaching the calving period.

19. Cow with garget; giving only two quarts of milk per day and soon to calve.
20. Gargety cow.
21. Cow injured some time ago and giving milk from only three teats.
22. Cow nearing the calving period.
23. Cow in poor physical condition.
24. Cow with two hind quarters of udder congested.
25. Cow recently calved.
26. Producer kept out of market supply only four milkings after calving; at this farm there were nineteen cows fresh from calf and the milk from these animals was being sent to this city.
27. Three cows approaching the calving period.
28. Cow in heat.
29. One cow in poor condition; has a cough and is much emaciated. Subsequently this cow was found to be tuberculous and was killed. The barn was dirty and poorly lighted.
30. Three cows recently calved.
31. Cow nearly dry.

A great responsibility devolves upon those trafficking in milk for its proper production and care, and only by the exercise of every precaution can the health of consumers be safeguarded. It should be borne in mind constantly that this food is an admirable vehicle for the dissemination of contagion, and proof of this fact is too often furnished with disastrous results. The occurrence of certain diseases like typhoid fever, scarlet fever and diphtheria, in those engaged in the production or sale of milk, or in their families, is a possible source of danger to consumers of milk so produced and sold, and it is better that such supplies be withdrawn for a time from use than that health or life should be sacrificed to greed or carelessness. When a contagious disease is found to exist at the place of production prompt notification of the fact should be made to the local health authorities; and if the supply is handled through a contractor or milkman, these latter should also be informed of the existing conditions.

The care of milk after it leaves the farm should be surrounded with equal precaution. The occurrence of contagious diseases in those so engaged or in their families should immediately be brought to the attention of the health officials in the city or town in which the supply is to be distributed. By this means, and with each producer and milkman alive to the danger likely to result from a contaminated milk supply and willing to make some temporary sacrifice in the interest of the health of the public, a possible obviating or lessening of the extent of epidemics may result. But under normal circumstances public milk supplies should be surrounded with never-ceasing watchfulness on the part of those handling this product in order to give adequate protection to the consumer. Each producer should be certain of the health of his cows; even a suspicion of abnormal condition should be sufficient to exclude the milk of suspected animals from the product sent to market. Having healthy stock, cleanliness and proper surroundings next become important factors. The cow barn should be arranged so as to reduce dust and dirt to a minimum, and there should be ample light and air space. The animals should be free from dirt, cow dung and loose hair; and all of the utensils used in milking or in sending the milk to market should have before use thorough washing and final treatment with steam or boiling water. Even with animals as free from dirt as efficient care can make them, some dirt is liable to find its way into the milk during milking. To lessen this source of danger as far as possible, the use of the so-called covered milk-pail is worthy of consideration. This type of pail assuredly decreases the area by which extraneous and harmful matter can contaminate the milk, and because of the fact is advantageous. Having the milk as clean as possible, straining and rapid cooling follow as essentials. For proper cooling a liberal employment of ice is necessary; spring and well water will not suffice. Especially objectionable is the attempt to cool milk by partially submerging the cans in tubs and troughs containing water, which latter is only occasionally renewed. Too often these devices are in the open air where the milk in the cans may be subjected to the influence of the sun's rays. Their use is attended with such danger as to warrant prompt condemnation.

With the milk as cold as it can be made with ice, it is next necessary to maintain it at the lowest possible temperature, and while in transit to the railroad station ice and coverings for the cans should be provided in the warm months of the year. When the milk is delivered at the station by the producer, provision should be made for its protection by some covering while awaiting the arrival of the train. It should not be exposed to the action of the sun, as was noted in one instance last summer where milk was allowed to remain upon the station platform previous to the arrival of the train. The temperature of every can of this milk tested was above that permitted by the regulation of the Boston Board of Health.

After being placed upon the cars, and while en route, the cans should be properly iced, and upon arrival the milk should be cared for with the utmost dispatch. The tasting of the milk should be so regulated as to avoid contact with the mouth of the individual engaged in this work. If spoons are employed, they should be cleansed after each can is sampled and before being again used. One large firm has this tasting done by means of the milk adhering to the large stopper on its removal from the can. The stopper is not replaced in the can after being so employed, but is thrown into the cleansing vat and subsequently washed.

If the milk is to be taken from the original cans and placed in other containers, all vessels used in its mixing and handling should before use have undergone thorough washing and treatment with steam or boiling water. After being placed in containers, the milk should be quickly cooled and kept so until delivered to the consumer. The delivery should also be made with the utmost dispatch.

Where milk is sold from shops all of the above precautions are necessary, and equal and continuous care devolves upon the shopkeeper. This includes absolute cleanliness, low temperature, protection of the milk from the odors of other articles of merchandise and its sale entirely removed and separate from that of other products. In summer, if the milk is delivered at an early hour before the shop is open, it should not be allowed to remain outside and become warm from exposure to the sun; means should be provided for its protection either by furnishing a box in which the cans may be placed, or by allowing the milkman to put the cans inside the store. With the milk kept cold bacterial increase is retarded. A possible source of contamination in shops is from drippings of milk which may fall from the outside of not over-clean cans and pitchers of customers while they are being filled. Shopkeepers should by example and care in handling milk seek to impress purchasers with the necessity of the greatest precautions in the use and keeping of this product.

Whatever the source of supply, the householder should keep milk at a low temperature at all times, protect it from dust and flies, and in its use employ only thoroughly cleansed utensils scalded with boiling water. With these precautions bacterial growth may be reduced to a minimum and the results are more satisfactory to the purchaser.

The contracting firms are important factors in improving the conditions surrounding the milk supply, and that the concerns furnishing milk to this city have done much to better the quality cannot be gainsaid. Their work upon this subject is commendable. During the year six of these firms made over 27,000 bacteriological examinations, and over 1,300 of these milk specimens were found infected. Where milk was high in number of bacteria the producer was notified of the fact and given advice as to obviating future trouble in this direction. If subsequent examination disclosed no improvement, dairies were notified in several instances to stop sending milk. Four of these concerns send agents or veterinarians to investigate the conditions under which the milk is produced, and whenever necessary changes are suggested to the farmer. One firm makes use of a filter of absorbent cotton. Through this the milk from a suspected can is filtered and the dirt is collected upon the cotton. The filter and dirt are then dried and subsequently mailed, if the quantity of filth is excessive, to the farmer as an object lesson to point to the necessity for greater cleanliness.

With samples of infected milk a prompt notice of this fact was issued to the farmer, and the product of the animals at fault, as soon as ascertained by subsequent examination of samples from individual cows, was not allowed to come to this market. One firm deems the finding of streptococci of such importance that the cows giving this contaminated milk are re-examined every two or three days, and the product of the whole herd is also inspected to make sure the infection has not spread. Another concern makes continuous examination of the milk of cows showing infection until the milk becomes normal, or, if the condition appears chronic, the farmer is advised to dispose of the cow. Efforts are made to ascertain the physical condition of the animals as to indications of fever, inflammation or garget.

The concensus of opinion with contractors is that the bacteriological examination of milk has already proved beneficial. One concern states that this is evident, and that 75 per cent. of the samples received contain less than 50,000 bacteria, and over 40 per cent. contain not more than 10,000 to the cubic centimeter. Under bacteriological supervision the number of samples containing not more than 50,000 bacteria to the cubic centimeter has greatly increased. Another firm states that each dairy investigated upon bacteriological basis has shown improvement.

During the year each firm made a substantial endeavor to procure better milk, in addition to bacteriological examinations. One small firm has a veterinarian who devotes half of his time to the dairies from which milk is received. Another firm has installed a modern plant in this city for the proper handling and care of its supply, and instituted a more vigorous dairy inspection. One concern employs an agent who gives all of his time to visiting the premises of dairymen, and where faulty conditions are discovered correcting them.

Others send agents into the country whenever such action is required. Suggestions and recommendations as to the production of milk of better grade were also made to producers by means of pamphlets and circulars. In several instances meetings of farmers have been arranged and the subject of *clean* and *cold* milk treated from lecture standpoint.

One concern has installed a system by which notification of the occurrence of a contagious disease at any farm from which milk is received is immediately sent to the firm. The contractor then pays the farmer for the milk during the continuance of the contagious disease; the milk so paid for is subsequently destroyed.

Temperature has an important bearing upon the keeping qualities of milk and its fitness as food. Ice in liberal quantities is an essential feature of a good milk supply, and the cooling of milk should take place immediately after milking, and be constantly maintained up to the time of utilization by the consumer. The iceing should be carried out regardless of any temperature regulation or standard, and the lowest possible point maintained not only at the farms, but by contractors, milkmen, shopkeepers and consumers. By means of ice even dirty milk may be kept for a long time, but clean milk properly cooled will keep sweet for a much longer period. A milk supply properly cooled and kept cold is an effective means of reducing infant mortality in a large city, and especially during the summer months. Because of this fact, even if the selfish motive of having the milk sweet enough to be salable is eliminated, efficient cooling should always be deemed essential by those engaged in its production, sale or use. Failure to keep milk cold comes under the head of criminal neglect. The contractors are insisting upon the use of ice at farms and are instructing producers as to the best method for its employment. This is advantageous, as rapid cooling at the dairy is of the greatest benefit. Milk should not be received at the cars in the country, however, unless it has a low temperature; moreover, milk which has not been cooled should not be brought to this city by the contractors.

During the warm months of the year many temperature tests were made. These included tests at the trains as they arrived from the country, and of milk upon wagons and in shops as it was being supplied to customers. Throughout the year all samples taken for bacteriological examination are tested for temperature. A gradual awakening to the need of keeping milk cold is noted, but it was found necessary to issue 591 warnings; 320 of these went to contractors, and they in turn forwarded these notices to producers. In some instances where repeated warnings failed to bring about the desired result prosecutions were deemed necessary. Fines of $10 to $25 were imposed in a number of instances.

During the summer it was found that specimens of cream containing a compound of lime were being distributed about the city. As a result of the three cases brought against the guilty parties, and the fines of $150 imposed, this practice ceased. On investigation it was learned that the addition of the lime compound was to thicken the cream, and that it was made in an adjoining State, from which the cream was being shipped to the city. A manufactured cream, having as a basis unsweetened condensed milk, was also brought to the attention of this Bureau. Analysis showed its composition to be as follows: milk solids, 21.64 per cent.; fat, 8.10 per cent.; ash, 0.98 per cent. This compound was being sold by one of the licensed dealers of the city, and at the price charged, namely, $1.00 per 8½ quart can, yielded a handsome profit.

For purposes of comparison, analyses of cream from various parts of the city were made, and from the standpoint of fat content the quality was excellent. The results follow, the tables being so arranged as to indicate the character of the three grades of cream obtainable in this market:

Heavy Cream.

Number.	Total Solids.	Fat.
1	47.35	40.50
2	45.55	39.00
3	44.40	37.50
4	45.35	37.00
5	44.35	36.50
6	42.50	36.50
7	42.05	36.50
8	44.45	36.25
9	43.25	36.00
10	42.10	35.00
11	41.35	34.50
12	41.60	35.50
13	41.95	35.00
14	40.40	35.00
15	40.00	34.00
16	41.00	34.00
17	44.85	33.50
18	44.90	33.50
19	40.30	33.00
20	39.60	32.50
21	39.40	31.50
22	39.80	31.00

Average per cent. of fat, 35.17.

Medium Cream.

Number.	Total Solids.	Fat.
1	37.10	29.50
2	36.80	29.50
3	35.15	29.25
4	37.00	28.50
5	35.55	27.50
6	35.30	27.50
7	33.80	27.00
8	32.45	26.50
9	33.25	26.50
10	32.35	26.50
11	33.45	26.00
12	33.25	25.00
13	32.45	24.50
14	29.65	23.00
15	29.45	22.50

Average per cent. of fat, 26.62.

Thin Cream.

Number.	Total Solids.	Fat.
1	26.85	20.00
2	27.45	19.50
3	26.45	18.50
4	26.40	18.50
5 *	24.10	16.50
6 *	24.20	16.50
7	23.30	16.50
8	23.60	16.00
9	22.65	15.25
10	22.20	14.50
11	21.65	14.25
12	21.60	14.00
13	18.20	10.50

Average per cent. of fat, 16.18.

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* Nos. 5 and 6 were obtained at the same creamery; No. 5 was marked "medium cream" and No. 6 was marked "light cream."

Upon recommendation of this Bureau, the State has just adopted a standard for cream of 15 per cent. of milk fat.

Renovated butter has never been sold to such an extent in this city as during the last year. Two reasons may be assigned for the large output of this rejuvenated substance. One is the high prices which have prevailed for the better grades of butter, and the other is the persistent efforts of the agents of the renovated butter concerns to secure a market for their product. This has resulted in an increase in the number of stores selling this butter, and numerous evasions of the law requiring the labelling of retail packages. Very few of the cases of non-marking were the result of ignorance of the law. In some instances the intent of the law has been violated by skilfully covering up with other portions of the wrapping paper that part of the paper bearing the words "Renovated Butter," and some dealers have made use of wrappers illegibly marked. Oftentimes these poorly stamped papers were marked at the time of the sale and after the papers were placed about the butter. No good reason can be assigned for a storekeeper, desiring to sell renovated butter honestly, being without a supply of well marked wrappers in anticipation of sales. At a few stores renovated butter is apparently sold upon the plan of marking it only when purchased by persons other than regular customers. The proprietors of several of these places have paid fines for infractions of the law amounting to fifty dollars. Renovated butter is also being used in many of the restaurants of this city.

Only two firms were found selling butter contaminated with boron compounds. The use of boron as a butter preservative has been reduced to a minimum by former prosecutions.

During 1905 and 1906 a number of butter samples were found to contain large quantities of water; these amounts were so abnormal that the percentages are given in detail in the following table:

Number.	Per Cent. of Water.	Number.	Per Cent. of Water.
1	38.53	**9**	26.03
2	33.10	**10**	25.59
3	28.84	**11**	25.54
4	27.43	**12**	24.62
5	26.38	**13**	24.25
6	26.28	**14**	22.57
7	26.28	**15**	22.44
8	26.06	**16**	22.14

Average per cent. of water, 26.63.

The sale of such butter is a fraud which should be stopped immediately; and as no standard had been established by law, a bill was introduced into the Legislature during the session of 1907 limiting the amount of water in butter to 16 per cent., this being the largest quantity of water permitted by other States where a standard has been adopted. Owing to the selfish interests of a few butter dealers, however, the legislative committee having this matter under consideration referred the subject to the next General Court. Meanwhile it is not unlawful to sell butter in this State even though it contains nearly 40 per cent. of water. At a price of over thirty cents a pound water is a profitable commodity. For purposes of comparison the quantity of water found in butter of good quality is given. These analyses were forty-one in number; average per cent. of water, 11.75. The minimum amount of water in these specimens was 7.4 per cent.; maximum per cent., 15.75.

Nineteen dealers are registered for the sale of oleomargarine, an increase of eight over last year. One brand of oleomargarine was found to be preserved with boron compounds without due notice by means of a label being given to purchasers. The seller was fined $50.

Recently oleomargarine was placed upon this market which appeared to be in imitation of yellow butter, and complaints were made against two firms dealing in this product. After a lengthy trial, the defendants were adjudged "not guilty," a ruling in a previous case by Judge Bishop of the Superior Court being an important element in this finding. At the trial of the latter case, Judge Bishop took the case from the jury and ordered a verdict of "not guilty." His interpretation of the law follows:

The question in this case depends upon Revised Laws, chapter 56, section 41, which is as follows:

> Whoever . . . sells . . . within the Commonwealth any article, product, or compound made wholly or in part of any fat, oil or oleaginous substance or compound thereof, not produced from unadulterated milk or cream from the same, which shall be in imitation of yellow butter produced from pure unadulterated milk or cream of the same, shall be punished by a fine of, etc., . . . but the provisions of the section shall not prohibit the manufacture or sale of oleomargarine in a separate and distinct form and in such manner as will inform the customer of its real character, free from any coloration or ingredient which causes it to look like butter.

The substance sold in this case was in a one-pound package clearly marked both on the wrapper and on an accompanying card, in large letters, as oleomargarine, and was by this means in a separate and distinct form in such manner as to inform a customer buying such package of its real character. The witnesses for the government testified that the substance was oleomargarine, and stated of what ingredients oleomargarine is made, including cotton seed oil, but no analysis of the article in question was produced to show its component parts. The color was yellowish and resembled butter. The Commonwealth offered to show that oleomargarine can be and is made without the use of cotton seed oil, and that oleomargarine which is not yellow, that is of the color of yellow butter, can be and is sold in the market. There was no evidence of the introduction of any substance for the purpose of coloring an article which would otherwise be oleomargarine.

The case therefore turns on the proper construction of the words at the end of the section, "free from any coloration or ingredient which causes it to look like butter." I think that the proper construction of these words is, any extraneous substance or ingredient which causes it to look like butter, and that if oleomargarine of itself and by reason of the color of the ingredients ordinarily and properly used to compose it looks like butter it is not an evasion of the statute. In other words, if the color which makes oleomargarine look like butter is incident to the use of materials needful in the production of oleomargarine, it is not coloration from an ingredient put in to cause it to look like butter. In such case it is the oleomargarine itself which resembles butter, and it is not caused to look like butter by a coloration or ingredient added for the purpose.

I think the principle laid down in the case of Ammon *vs.* Newton, 50 N.J. Law 543, is applicable to this case.

Verdict of "not guilty" is directed.

In a recent case outside of Boston another Massachusetts judge has supported the ruling of Judge Bishop.

At present oleomargarine is being manufactured which is as yellow as the yellowest butter, the makers of the same taking advantage of the fact that any natural coloring in an oil can be used under this decision. This was not the intent of the framers of the law, and under existing conditions presents a farcical situation. Annatto and other butter colors might as well be legalized in oleomargarine as colorations and ingredients in natural fats and oils which render the oleomargarine equally yellow and just as much an imitation of yellow butter. It was desired under this law to prevent fraud and that oleomargarine should be in a separate and distinct form from butter, and a large majority of the manufacturers are so preparing it. One or two concerns in an adjoining State are, however, making this yellow imitation butter, oleomargarine, and are using Massachusetts as a dumping ground for their product. To meet this situation and to give the law its original intent, an amendment to this section is necessary. Otherwise, the entire section should be repealed.

Many cider vinegars were found during the year in which the appearance had been improved from the trade standpoint by means of coloring matters. In some instances this was accomplished by means of coal-tar dyes, the combination most frequently employed having the fanciful designation of "caramelle." This is a mixture of coal-tar dyes and imparts to vinegar a rich brown color. In every instance these vinegars were traced to the manufacturer; and two manufacturers, for this infringement of the law, paid fines amounting to $500. Some specimens of spurious cider vinegar were also found upon this market in which the quantity of solid matter was increased by means of glucose. In two instances of this form of adulteration, and where the vinegar was made outside of this State, manufacturers' agents were fined $150.

The sale of white wine vinegar colored with caramel has practically ceased, and molasses vinegar has taken its place to a large extent.

Cases were brought against dealers who persisted in handling caramel colored vinegar; and prosecutions were also brought for the sale of molasses vinegar for cider vinegar, and for vinegars of the various kinds falling below the legal standard for acidity.

A summary of the year's prosecutions follows:

For sale, or possession, or custody with intent to sell, of milk not of good standard quality	227
For possession with intent to sell of milk containing added water	2
For possession with intent to sell of cream containing a compound of lime	3
For possession or custody with intent to sell of milk deficient in fat	5
For possession or custody with intent to sell of watered skimmed milk	3
For milk having a temperature higher than fifty degrees Fahrenheit	17
For use of a milk can as a container for blood . .	1
For sale of adulterated cider vinegar	3
" of adulterated vinegar	4
" of vinegar not made from cider as cider vinegar,	13
" of vinegar colored with coal-tar dyes or with caramel	13
" of adulterated butter	5
Carried forward	296

Brought forward	296
For sale of renovated butter not properly marked	30
" of oleomargarine not properly marked	2
" of oleomargarine not being licensed	4
" of oleomargarine in imitation of yellow butter	1
" of oleomargarine containing borax	2
For peddling oleomargarine in an unmarked vehicle	2
For furnishing oleomargarine in a restaurant	6
	343

The results of prosecutions were as follows:

Number of warrants returned without service	2
" of cases in which defendants ran away	4
" of cases on file	17
" of cases dismissed on motion of complainant	8
" of acquittals	8
" of convictions	304
	343

The amount paid in fines was	$5,320 00
Receipts from license fees	833 00
Total	$6,153 00

Respectfully submitted,

JAMES O. JORDAN,
Inspector.

REPORT ON OUTBREAK OF SCARLET FEVER.

BOSTON, MASS., May 3, 1907.

To the Board of Health, Boston, Mass.:

GENTLEMEN, — In accordance with your directions I have investigated the outbreak of scarlet fever which occurred in the early part of last January. The report on the same is herewith appended.

Respectfully submitted,

CARLISLE REED, S.B., M.D.

GENERAL STATEMENT REGARDING CASES.

During the early part of January, 1907, an unusually large number of scarlet fever cases were reported to the Board of Health. On January 9, 37 cases were reported, on the 10th 78, on the 11th 65, on the 12th 54. On the 13th the number of cases dropped to 19 and did not rise alarmingly again. The cases were widely scattered over Boston, but were particularly numerous in the South and West Ends and in part of Roxbury. Wards 8 and 10 were the worst sufferers, with Wards 9 and 17 next. The North End, however, was practically free from the disease, having at that time but two cases. East Boston also seemed to enjoy a comparative immunity. There were but few cases in South Boston, Brighton, West Roxbury and Dorchester, although each locality developed other cases later.

Through the sanitary inspectors it was learned that the greater part of the families in which cases of scarlet fever had occurred were taking their milk from a large milk contractor whom we will designate as "A." This was the only thing in common among the families except the water supply, and that was not considered a factor. On this account it was decided to investigate "A's" milk supply and find if possible the sources of contagion. "A" was notified of the state of affairs and promptly took measures to find and remove the source of infection. All the milk supplied to the family trade at that time came from two cars — one car coming from New Hampshire and the other from Central Massachusetts, milk being taken on at various stations. On arrival at Boston this milk was bottled and supplied to about four thousand customers in Boston and to customers in Cambridge, Somerville, etc. The milk route did not extend to Brighton, West Roxbury or the outer part of Dorchester. This explains the comparative immunity of these parts.

PROCEDURE AT THE MILK SHED.

The two milk cars which supply the family trade are brought directly to the door of the milk shed. The milk taster then opens the cans and licks the stoppers with his tongue to see if the milk is fresh. The stoppers are not replaced, but thrown to one side. A great part of the milk was tasted with a spoon. But one spoon is used, and this is not even rinsed between cans — the taster plunging the spoon which he has just taken from his mouth into the next can. It was said that some of the tasting was done by dipping a finger into the milk in place of the spoon. This was not observed. The cans are then emptied into a small tank which is placed in the door of the car, and the milk is carried by a pipe directly to a large mixing tank in the milk-room inside the building. The milk is mixed in this tank by stirring it from time to time with a paddle. From here the milk is pumped to the cooler, where it falls in a thin film over a series of water-cooled pipes. The milk from the cooler is caught in a tank and conveyed to a second tank, where it is strained through cheese-cloth. From here the milk is drawn off to the bottling machines — three in number — each of which is capable of filling mechanically twelve bottles at a single operation.

CLEANING OF BOTTLES.

The empty dirty bottles are brought to the door of the shed by the drivers and are placed in galvanized iron boxes, fitted with slatted covers, and are then inverted and placed in the washing machine. In this machine they receive hot water (containing washing soda) and steam thrown with sufficient force to remove all traces of milk from the bottle. In a second section they are rinsed with hot water and steam and finally emerge practically dry and sterile. Bottles from houses where there is a contagious disease are collected by a special driver and are boiled for twenty minutes in a separate shed and later subjected to the usual treatment. The bottles hot from the washing machine are slipped through a slide into the milk room and the boxes of bottles piled up until they are needed — a few hours or a few minutes. The bottles are not touched by hand from the time they enter the washing machine until the cap is placed on the filled bottle by the capper. This rules out any possible infection from returned bottles. The cans are washed in a similar manner and the plugs are boiled before they are returned to the farms.

CAPPING.

The filled bottles from the bottling machines are pushed along a platform to the cappers, who insert the little pasteboard discs in the necks of each bottle. After that the bottles are placed in a refrigerator until it is time to send the milk out.

POSSIBLE SOURCES OF INFECTION DURING HANDLING.

A. At the Farm.

The milk might have become infected at one of the farms.

B. At the Milk Shed.

It might have been infected at the milk shed by (1) the milk taster, (2) the man who emptied the cans in the car, (3) by the mixer, (4) by the man from the laboratory in taking temperature, samples, etc., (5) by the bottlers, (6) by the cappers.

C. By the Drivers.

In handling the jars during delivery.

INVESTIGATION OF POSSIBLE SOURCES OF INFECTION.

A. The Farms.

Through the local agents of the contractor each farm which forwarded milk was investigated to see if there were or had been any case of scarlet fever thereon. This investigation was made first by inquiring at each station and later by a house canvass of the entire number of farms, about 200 in all. Not even a suspicious case was found.

B. At the Milk Shed. Examination of the Men.

On January 13, "A" had all the men then at work in the milk shed who had anything to do with the milk examined by a physician, but with no result. On the afternoon of the same day I examined fourteen of the men, and the next day made several more examinations (some of the same men having been examined the previous day), seeing every man in the milk room, washing department, and car men. No suspicious cases were found. At that time the men who were employed in bottling the milk were certain of the drivers of the milk wagons. Fourteen men worked in the milk room and five on the cars.

CASES OF SCARLET FEVER AMONG EMPLOYEES.

Only one case of scarlet fever was reported or detected among the employees of the milk room — that of a capper. This man was taken sick on January 7, at the height of the outbreak. One boy employed in the laboratory had scarlet fever January 6.

EMPLOYEES' FAMILIES.

A list was obtained of "A's" employees and a visit made to the home of each man in order to find out if anybody had had scarlet fever during the first week in January. Twelve outside men were not looked up at their homes, but were interviewed. They had nothing to do with the milk. This search extended into Chelsea, Everett, Medford, Malden and Somerville as well as Boston. As a result of this search it was found that there had been twenty-eight cases among the employees' families between January 2 and 10, all of whom drank milk occasionally.

Table Showing Cases Among Employees' Families.

	DATE OF ONSET.							Total.
	January 5.	January 6.	January 7.	January 8.	January 9.	January 10.	January 11.	
Number of cases........	2	8	11	2	2	2	1	28

All of these cases correspond in date — with perhaps the exception of those on the 5th — with the onset of the Boston cases (see "Onset" chart). If, however, it is remembered that all of "A's" men use "A's" milk, and that many of them take it home with them at night, thus getting it several hours earlier than the general public, and thereby being exposed to any contagion in the milk just so much sooner, it may safely be said that the two cases occurring on January 5 should be grouped with the rest. Both of these cases occurred in the families of drivers of milk wagons. In one case another driver boarded with the family. None of the three men, however, had anything to do in the milk room, and, in fact, never went in there. They simply loaded their teams at the door of the shed. Infection through contagion carried by them does not seem probable.

C. The Drivers.

The possibility of infection being spread by the drivers handling the bottles during delivery can be ruled out by the fact that there were but three early cases — two on the 5th and one on the 6th — in two families. The outbreak was by no means confined to the routes supplied by these men.

Table Showing Classification of Employees in Whose Families Scarlet Fever Occurred.

Employees' Occupation and Number of Men.	Number of Cases in Families.	Date of Onset.
1 capper (and driver)..........	3	January 7 (capper); January 9; January 11.
1 superintendent milk room...	2	January 7; January 8.
1 superintendent cream room..	2	January 7, and January 7.
1 worker in cream room.......	1	January 9.
*8 drivers........................	8	January 5, 2; January 6; January 7, 3; January 8.
1 teamster.......................	1	January 7; January 10.
3 laboratory helpers	6	January 6, 6 (1 helper); January 7.
1 bottler of baby milk..........	2	January 6, 2.
1 can washer....................	1	January 10.
1 night watchman..............	1	January 7.
1 bill collector..................	1	January 7.
20 men..........................	28 cases.	

* Also one night watchman.

Of the infected families mentioned in the above table but two need special remarks, since in all other cases the employee who might otherwise be suspected of being the infecting agent in each case did not come in contact with the milk in such a way as to be capable of infecting it.

In the family of the infected capper, two other members were taken sick, one on the 9th and the other on the 11th of

January. It is worthy of note that the capper had had scarlet fever several years before, as had one of the two other infected cases in the family.

In the family of the superintendent of the milk room, two children were taken sick, one on the 7th and the other on the 8th of January. It should be stated, however, that the superintendent is actually outside the milk room the greater part of the time attending to the loading of the wagons, storage of the milk, etc., etc. In neither of the above families then could the source of the infection be located, since the inception of the cases were coincident with or subsequent to the general outbreak.

One case developed in "A's" family on January 7.

One boy who was employed as a helper in the chemical laboratory was taken sick with scarlet fever on January 6. Four other members of his family were taken down on the same day.

One man not mentioned above, and not regularly employed in their milk room, deserves special mention on account of the possibilities of his infecting the milk were he himself infected, and also because of circumstantial evidence at one time pointing strongly to him as the possible cause.

In tasting he used a spoon, dipping it into the can, lapping the spoon and plunging it into the next can without even rinsing. This man was not among those examined by me on January 14 or 15, and his name was through an error not among those given me as occasionally working in the milk room. Subsequent inquiry developed the fact that this man on January 3 took the place of the regular taster in the milk room, who was away from work on that date (not on account of sickness). As it will be shown later that January 3 was probably the date on which the infected milk was bottled, and as January 3 was the only date when this man came in contact with the bottled milk, the importance of ascertaining the condition of his health and that of his family on that date becomes apparent. He was seen by a physician at this time, who reports * that "the man showed a tongue with markedly prominent papillæ, back and chest covered with pimples, but no signs of desquamation or other symptoms warranting a diagnosis of scarlet fever. Examination of his family showed that his daughter had much enlarged tonsils, a tongue with markedly enlarged papillæ and signs of a fine scaly desquamation over the lower legs — signs suggestive, but not diagnostic of scarlet fever."

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* See Bulletin Massachusetts State Board of Health, March, 1907, page 80.

The family of this man was visited by me during January, but on the statement of the mother (and through her, of the family physician) that there had been no recent sickness in the family, no physical examination was made by me at that time. Several months later the man and his family were examined by the writer and another physician connected with the Board of Health with the result that the same conditions as above described were found, with the exception that the man showed at this time no enlarged papillæ and the child showed no desquamation. According to the statement of the mother, this child had had scarlet fever four years before and was subject to enlarged tonsils.

Further investigation at the contractor's developed the fact that this man employed in the milk room as taster on January 3 was regularly employed as taster on the can milk for the pedlers, and was so employed on January 2 and 4. No outbreak, however, developed among the pedlers' trade, as might have been expected had this man been the cause of the epidemic among the bottle trade. Moreover, had this man been infected on January 3 he must have infected practically every can tasted, with the result that the infection would have been very extensive and cases would undoubtedly have occurred on all bottle routes, while as will be shown later some routes were unaffected and the actual number of cases compared with the total number of people using the bottled milk was fairly small.

Table Showing Number of People in Employees' Families, with Morbidity of Same.*

	AGES.														UN-KNOWN.		Total Individuals.
	Under 1 yr.	1 year.	2 years.	3 years.	4 years.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 to 15 years.	16 to 20 years.	Adults.	Child.	Adult.	
Drink milk	5	15	16	16	9	14	13	2	9	8	12	21	25	216	.....	.....	381
Occasionally drink milk	...	...	...	...	...	...	1	...	...	1	1	3	4	79	.....	....	89
Never drink milk	12	2	...	1	...	...	1	...	...	1	...	1	....	73	.....	.....	91
Unclassified	...	...	...	...	...	...	...	...	...	...	...	....	....	....	7	31	38
Totals	17	17	16	17	9	14	15	2	9	10	13	25	29	368	7	31	599
Morbidity	13 cases, 8.90%.											12 cases, 22.22%.		3 cases, 0.82%.	Average Morbidity, 4.67%.		

*Twelve families not seen; men had nothing to do about milk shed.

INVESTIGATION OF CASES OF SCARLET FEVER IN BOSTON.

The Boston cases were then looked up partly by me and partly by the inspectors. By referring to the chart marked "Date of Report," it will be seen that the greatest number of cases were reported on January 9, 10, 11 and 12, and, by referring to the companion chart, marked "Date of Onset," that the first symptom in the greater part of these cases occurred on January 6, 7, 8 and 9. In both charts there is the same sudden abrupt rise and fall.

This sudden rise and as rapid fall, in all occupying but four days, indicates that there was but one dose of infectious material. Had the infection been of greater duration than one day, it is probable that the period when a large number of cases were appearing would have been larger. The incubation period of scarlet fever is variable, and that is why a single day's infection is able to make itself felt over three or four days. According to various writers on the subject, scarlet fever makes its appearance within a few hours to a week after exposure; in the great majority of cases, however, in three or four days.

Taking that as a basis, and taking January 7 (the heaviest day) as the apex of the outbreak, it brings us to the conclusion that the infection took place on January 4. By this is meant that the infected milk was ingested January 4. That would make the date of infection of the milk, if at the contractor's, January 3, or a day earlier, if at the farm (since the milk bottled on one day is not sent out until the next). That the infection was through the milk is clearly shown by the fact that of the 227 cases which occurred (onset) on January 6 to 9 inclusive, 195, or 85.9 per cent., took milk from "A," while the other 32 cases, or 14.1 per cent., were supplied by 17 other dealers. This is also borne out by the experience of Cambridge and Somerville, where, in the great majority of cases, those who had scarlet fever took milk from "A." These cases also appeared on the same dates.

The question how the infection got into the milk is difficult to answer. Only one man at "A's" milk room had scarlet fever (the capper), but his first symptom appeared on January 7, the heaviest day. The laboratory boy was taken sick on January 6. He had nothing to do in the milk room. Some of the German writers state that the secretions of the mouth and throat are contagious early in the disease, and even before symptoms appear, but nobody, to my knowledge, has ever claimed that a man could be in such a condition as to give scarlet fever to others and yet have no symptoms himself for four days, actually having his first symptoms at the same time as the people to whom he has communicated the disease! It seems evident enough that the capper could not have been infectious for a sufficiently long time to have caused damage. No source of infection could be found in the milk shed, the employees' homes, nor was any case discovered at the milk farms by the agents of "A." It seems most probable that it came from some unrecognized case back in the country on one of the farms. A single can of milk infected in this way would be sufficient to infect a large amount of milk if mixed in the tank with the rest. As a matter of fact it takes about two hours for the milk poured from the cans to be mixed in the tank and bottled. Thus it will be seen that it makes some difference at what point the infected can was poured into the mixer. If it were the last can emptied the greater part of the milk would have been already bottled and would not be infected; if it were the first considerable milk would probably be infected before all the milk from the infected can had been drawn off from the tank. As there were 195 cases infected in Boston, as well as a large number in other cities, it is probable that it was not the last can poured in — and considerable milk must have been infected. According to the contractor's statement a few of his milk routes had no cases, while others had but one or two during the outbreak. This would tend to show that the milk was not equally infected throughout — the milk going to the unaffected routes having been drawn off before the infection was added.

Whether or no the organism of scarlet fever is able to grow in milk as a culture medium, like bacteria, is not known; hence, any theory of further infection by growth of the organism must be set aside as pure speculation.

As the cases as a whole were very mild it is possible that many people took infected milk into their systems and suffered no harm from it. Those with a lower power of resistance succumbed to the disease. The virulence of the organism apparently was mild.

Cases Occurring in Boston.

An investigation of those cases which occurred in Boston between January 6 and 9 was made. Of these 195 cases were among "A's" customers. The following table shows their distribution by age, as well as the per cent. of children, youths and adults taken sick:

	Ages.												Adult.
	1 year.	2 years.	3 years.	4 years.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 to 15	16 to 20	
Number of cases........	8	16	22	11	22	6	11	11	7	8	21	12	28
Per cent. morbidity....	133 cases, 68.21%.										34 cases, 17.44%.		28 cases, 14.35%.

According to this table it is readily seen that children were for the most part attacked. This is natural, as scarlet fever is ordinarily a disease of childhood. As far as could be learned all of the children drank milk to some extent. Three of the adults were said not to use milk, but whether or not they used it on cereals is not certain. From this it is seen that about 85 per cent. of the cases partook of the suspected medium at a time when it was believed to be infected.

A list of all of "A's" customers in Boston to whom the bottled milk was delivered was then procured. The list contained over 4,000 names. All these persons were looked up by the inspectors and the same questions asked as in the scarlet fever cases. In all 3,654 families, including 14,878 individuals, were reached. During the latter half of the investigation an attempt was made to find out how many had already had scarlet fever and might thus be supposed to be immune. (This immunity very infrequently has an exception — note the second attack in the case of the bottle-capper and also in his sister.) This work took over two months to complete.

Statistics of 3,654 Families, including 14,878 Individuals.

	Ages.														Totals.
	Under 1 yr.	1 year.	2 years.	3 years.	4 years.	5 years.	6 years.	7 years.	8 years.	9 years.	10 years.	11 to 15 years.	16 to 20 years.	Adults.	
Drink milk......	156	234	283	305	269	261	268	239	227	212	219	928	617	6,916	11,134
Do not drink it..	105	39	44	33	22	38	28	44	45	39	38	202	156	2,911	3,744
Totals	261	273	327	338	291	299	296	283	272	251	257	1,130	773	9,827	14,878

Under 11 years....3,148 = 21.2 per cent.
11 to 21 years......1,903 = 12.8 per cent.
Adults..............9,827 = 66.0 per cent.
14,878 100 per cent.

Previously had Scarlet Fever and are thus Immune.

	Ages.			Totals.
	1 to 10 years.	11 to 20 years.	Adults.	
Number	73	104	323	500

By comparing this table with the last, it will be seen that on January 3 (or 4), 14,878 individuals were exposed to scarlet fever supposed to have been carried by milk. Of this number 11,134 were milk drinkers. The number of cases resulting was 227 (195 of which were among "A's" customers). This gives us a morbidity among the milk drinkers of 1.75 per cent. (192 cases), and among the non-milk drinkers (3,744 individuals with three cases), about 0.08 per cent. The morbidity for the total number of persons exposed, minus the 500 persons rendered immune by previous attacks, gives us 1.35 per cent. among 14,378 individuals. This may seem a very small percentage of disease, but it must be remembered that there was but one infection, and that with an organism of low virulence, and that probably all of the milk was not equally infected. Many of the persons listed as non-drinkers of milk actually consumed some of the raw article on cereals, puddings, etc. Many took it only in coffee, but in that case the heat of the coffee would be sufficient to destroy the organism.

A comparison of the "onset" and "day of report" charts show that while 234 cases were reported between the 9th and 12th of January, 227 cases had their first symptom on the four days of January 6 to 9. From this it seems that the cases are reported promptly as a whole.

A comparison of the number of cases reported during the first 21 days of January, 1906 and 1907, shows 414 for 1907 against 92 cases for 1906, an increase of 350 per cent. Of the cases reported during the first three weeks of 1907, 53⅓ per cent. were treated at home and 46⅔ per cent. were taken to the hospitals. Compared with the record for the month of January, 1906, 52.1 per cent. of the cases were treated at home and 47.9 per cent. at the hospitals. This gives about the same percentage for home and hospital treatment for both years.

Two interesting families were noted. In one, the family of a boy who helped in the chemical laboratory at "A's," four individuals were taken ill within an hour on January 6.

The first symptom in each case was vomiting, and the cases were at first taken to be poisoning from food, but later proved to be scarlet fever. One case died later. This was a Somerville family. In the other family five cases were taken down in two days. All had drunk freely of the infected milk. Families where two individuals were stricken the same day or on two successive days were not uncommon.

CONCLUSIONS.

1. Infection was carried by the milk supplied in bottles by "A" to his family trade.
2. The milk was evidently infected on one day only, probably being ingested on January 4. This would mean that the milk became infected, if at the farm, on January 2, if at the contractor's, on January 3.
3. It would appear that a part only of the bottled milk was infected.
4. The virulence of the infection was mild.
5. The infection of the milk with the organisms causing scarlet fever must have taken place either at the farm or at the milk shed during the necessary handling of the milk.
6. Investigation of possible sources of infection at the contractor's reveals no case to which the outbreak can be definitely assigned. During the inquiry made by the contractors at the farms producing the milk no cases of scarlet fever were found.
7. Taking the evidence as a whole, it would appear probable that the infection of the milk took place at one of the farms from a mild, unrecognized case of scarlet fever.

REPORT OF PORT PHYSICIAN.

To the Board of Health:

GENTLEMEN, — I herewith submit the annual report of the Quarantine Department for the year ending February 1, 1907.

During the past year all vessels from foreign ports, with the exception of the British Maritime Provinces, have been inspected, and from June 1 to November 1 all vessels from ports south of Virginia have been inspected. Under a recent ruling of the Treasury Department all vessels from Porto Rican ports are classified with those coming from southern ports.

From February 1, 1906, to February 1, 1907, 848 vessels of all descriptions were inspected; 38 vessels disinfected; 600 passengers vaccinated.

Bills to the amount of $4,950 were turned over to the City Collector.

There were admitted to the Quarantine Hospital 113 cases, classified as follows: scarlet fever, 48; measles, 30; chicken-pox, 9; leprosy, 1; observation, 22; variola, 3. The only death was from scarlet fever.

The number of passengers inspected was 89,315 — the largest in the history of the department.

Respectfully submitted,

PAUL CARSON.

REPORT OF GEORGE A. SARGENT, M.D.

January 1, 1907.

To the Board of Health:

GENTLEMEN, — I have the honor of submitting the following report for the past year. At the vaccinating station on Chardon street the number of vaccinations was 2,124. Of these 2,093 were primary, 31 were secondary. The total number of certificates issued consisted of 1,308. Many of those vaccinated do not return as they should for inspection. So far, however, as can be ascertained from those cases of primary vaccination where those scarified have returned, success has been practically perfect. The Suffolk County Jail has been visited daily. The number of cases treated was 2,673, the number of visits made being 5,338. A tabular list of the cases treated at the jail is appended.

The Chardon Street Home has been visited.

Respectfully submitted,

GEORGE A. SARGENT, M.D.

Tabular Statement of the Diseases Treated at Suffolk County Jail for the Year ending December 31, 1906.

DISEASES.	Remaining Jan. 1, 1906.	Treated during the Year.	Recovered.	Improved.	Sent to Hospital.	Sent to Insane Hospital.	Discharged from Custody.	Died.	Remaining Dec. 31, 1906.
General Diseases:									
Cold	....	136	136	....	....	....	....	....	....
Debility	....	6	......	6	....	....	....	....	....
Fever, intermittent	....	5	5	....	....	....	....	....	....
Phthisis	....	4	......	....	....	....	4	....	....
Rheumatism	....	120	120	....	....	....	....	....	....
Diseases of the Nervous System:									
Delirium tremens	2	125	127	....	....	....	....	....	....
Carried forward	2	396	288	6	....	...	4	....	....

STATEMENT OF THE DISEASES TREATED.—*Continued.*

DISEASES.	Remaining Jan. 1, 1906.	Treated during the Year.	Recovered.	Improved.	Sent to Hospital.	Sent to Insane Hospital.	Discharged from Custody.	Died.	Remaining Dec. 31, 1906.
Brought forward	2	396	388	6	....	....	4	....	....
Epilepsy	.. ..	4	......	....	....	....	4	....	.. ..
Locomotor ataxia	..	1	......	....	....	....	1	....	....
Neuralgia		144	144	....	....	....	.. ..	....	....
Neuritis	....	1	1	....	....	....	....	....	....
Sciatica	....	2	2	....	....	....	....	....	....
Diseases of Intellect:									
Dementia	....	11	......	....	....	11	....	....	...
Mania, acute	....	1	......	....	....	....	....	1	....
Diseases of Circulatory System:									
Cerebral hæmorrhage	....	1	1	....	....	....	....	....	....
Heart Disease	...	5	......	4	....	....	....	1	....
Verix	....	2	......	2	....	....	....	....	....
Diseases Involving Bronchi:									
Bronchitis	....	12	12	....	....	....	....	....	....
Diseases of Glands:									
Adenitis	....	1	......	1	....	....	....	....	....
Diseases of Fauces:									
Pharyngitis	....	20	20	....	....	....	....	....	....
Stomatitis	....	13	13	....	....	....	....	....	....
Tonsillitis	...	8	8	....	....	....	....	....	....
Diseases of Larynx:									
Laryngitis	....	3	3	....	....	....	....	....	....
Diseases of Kidneys:									
Nephritis	....	1	......	....	....	....	1	...	....
Diseases of Digestive System:									
Colic	....	26	26	....	....	....	....	....	....
Constipation	...	855	855	....	....	....	....	.. .	....
Diarrhœa	....	271	271	... .	....	....	....	....	....
Indigestion	....	121	......	121	....	....	....	....	....
Functional Diseases of Women:									
Dysmenorrhœa	....	10	......	10	....	....	....	....	....
Menorrhagia	....	2	......	2	....	....	....	....	....
Carried forward	2	1,911	1,744	146	....	11	10	2	....

STATEMENT OF THE DISEASES TREATED.—*Continued.*

DISEASES.	Remaining Jan. 1, 1906.	Treated during the Year.	Recovered.	Improved.	Sent to Hospital.	Sent to Insane Hospital.	Discharged from Custody.	Died.	Remaining Dec. 31, 1906.
Brought forward	2	1,911	1,744	146	....	11	10	2	....
Metrorrhagia	....	1	......	1	....	....	....	....	....
Pregnancy	....	1	1	.....	....	....	....	....	....
Diseases of Cutaneous System:									
Acne	....	4	4	.....	....	....	....	....	....
Clavus	....	2	2	.....	....	....	....	....	....
Dermatitis	....	13	13	.....	....	....	....	....	....
Eczema	....	9	.....	9	....	....	....	....	....
Furuncle	....	9	9	.....	....	....	....	....	....
Herpes	....	1	1	.....	....	....	....	....	....
Lupus	....	3	2	.....	....	....	....	....	1
Paronychia	....	4	4	.....	....	....	....	....	....
Phthisiasis	....	55	55	.....	....	....	....	....	....
Psoriasis	....	1	.....	1	....	....	....	....	....
Scabies	1	76	77	.....	....	....	....	....	....
Sycosis	....	1	1	.....	....	....	....	....	....
Tinnea Circinnata	....	3	3	.....	....	....	....	....	....
Urticaria	....	8	8	.....	....	....	....	....	....
Verruca	....	4	4	.....	....	....	....	....	....
Diseases of Eye:									
Conjunctivitis	....	37	37	.....	....	....	....	....	....
Hordeolum	....	1	1	.....	....	....	....	....	....
Diseases of Ear:									
Otitis	....	6	6	.....	....	....	....	....	....
Poisons:									
Opium habit	....	25	10	.....	....	....	15	....	....
Parasites:									
Tænia	....	1	1	.....	....	....	....	....	....
Surgical Diseases:									
Abscess	....	24	24	.....	....	....	....	....	....
Chancroid	....	2	......	.....	....	....	2	....	....
Chronic ulcer	....	19	......	19	....	....	....	....	....
Gonorrhœa	....	81	20	40	....	....	18	....	3
Carried forward	3	2,297	2,022	216	....	11	45	2	4

STATEMENT OF THE DISEASES TREATED.—*Concluded.*

DISEASES.	Remaining Jan. 1, 1906.	Treated during the Year.	Recovered.	Improved.	Sent to Hospital.	Sent to Insane Hospital.	Discharged from Custody.	Died.	Remaining Dec. 31, 1906.
Brought forward	3	2,297	2,022	216	....	11	45	2	4
Hæmorrhoids	....	4	......	4	....	....	....	....	....
Hernia	....	3	......	3	....	....	....	....	....
Leucorrhœa	....	3	.....	3	....	....	....	....	....
Orchitis	....	1	1	.....	....	....	....	....	....
Syphilis	2	80	......	80	....	....	....	....	2
Injuries:									
Abrasions	....	57	57	.....	....	....	....	....	....
Burns	....	3	3	.....	....	....	....	....	....
Contusions	....	29	29	.....	....	....	....	....	....
Dislocations	...	2	2	.....	....	...	....	....	....
Fractures	....	3	3	.....	....	....	....	....	....
Frost-bites	....	2	2	.....	....	....	....	....	....
Sprains	....	24	24	.....	....	....	....	....	....
Wounds:									
Gun-shot	...	2	2	.....	....	....	....	...	....
Incised	....	17	17	.....	....	....	....	....	....
Lacerated	1	46	47	.....	....	....	....	....	....
Scalp	1	81	82	.....	....	....	....	....	....
Total	7	2,654	2,294	306	....	11	45	2	6
Malingering	....	13	13	.....	....	....	....	....	....
Grand total	7	2,667	2,304	306	....	11	45	2	6

REPORT OF SUPERINTENDENT OF PEDLERS.

CITY BUILDING, NORTH GROVE STREET,
BOSTON, February 1, 1907.

To the Board of Health:

GENTLEMEN, — I have the honor to submit the following report for the year ending January 31, 1907:

During the year 88 licenses were granted to remove bones, grease, etc.: in March, 10; April, 71; June, 3; December, 2; and January, 2. The renewals of licenses to remove bones, grease, etc., were: in February, 78; March, 70; May, 68; June, 72; July, 75; August, 74; September, 76; October, 73; November, 76; December, 62; and January, 70.

In accordance with chapter 47, section 86, of the Revised Ordinances, 1,006 pedlers were assigned numbers.

The vehicles inspected were: in March, 437; April, 453; May, 433; June, 436; July, 478; August, 434; September, 479; October, 437; November, 422; December, 397; and January, 390. The vehicles and receptacles used by pedlers and collectors of bones, grease, etc., are in good condition.

The 64 vehicles used by farmers for taking swill from the sanitary yard at Tenean street, Dorchester, were given special attention; 35 were found to be leaking, 14 were very dirty. They were made water-tight and clean; but in December the use of the Dorchester yard for the distribution of swill was discontinued, thus doing away with the necessity of further supervision.

Manure wagons show a marked improvement in cleanliness, and apparent care by owners and drivers.

The City Collector received $2,755.14 from pedlers during the year for licenses issued by the Secretary of State.

Respectfully submitted,

JOHN MCLOUGHLIN,
Superintendent of Pedlers.

SANITARY INSPECTION OF PUBLIC BUILDINGS.

Circular 14.

Mayor's Office,
Boston, Mass., September 15, 1906.

To the Heads of Departments:

The National Association for the Study and Prevention of Tuberculosis recently adopted the following resolution:

"*Resolved,* That in the interest of Preventive Medicine and the cause of Industrial Hygiene, this Association respectfully recommends to the Chief Executive of the Nation the desirability of instituting an inquiry through the proper offices of the government as to the sanitary conditions existing in all government offices and workshops where a large number of persons are employed, especially with a view of recommending, if necessary, measures for the prevention of tuberculosis thereon."

In view of this resolution, and in the interest of the public service, I hereby promulgate the following order with the object of eliminating and preventing tuberculosis among the employees of the City of Boston:

It shall be the duty of the head of each department to transmit to all employees under his control the following rules and information, intended to prevent the spread of tuberculosis, and to require the display of these rules in such manner and in such number as is necessary to carry out their intent.

It is hereby required of each department to ascertain from time to time the names of persons in service in said department afflicted with tuberculosis, and to present to them the printed rules for their observance.

The non-observance of these rules shall, in the discretion of the head of the department, be considered a just cause for separation from the service.

Whenever there is a doubt with regard to any person in the city service, as to whether said person is afflicted with pulmonary tuberculosis, an order shall be issued by the head of the department for said person to present himself (or herself) at one of the City Hospitals for examination, and to present the department a certificate from the Superintendent or other authorized officer of the said hospital showing the result of said examination.

The Board of Health is hereby directed to cause a thorough sanitary inspection of the public buildings and workshops under the various city departments; and said Board is authorized to detail from its respective medical services a Sanitary Board, or Boards, for this purpose. The Sanitary Board, thus appointed, shall report upon:

First. — Insanitary conditions immediately remediable.

Second.— Insanitary conditions requiring structural changes.

The said Board, when entering upon its duties in any department, shall report to the executive head of said building or workshop, who shall, on the request of the Board, give such assistance as may be required.

The Sanitary Board shall make reports to the Board of Health, and said Board of Health shall transmit a full report with recommendations to the Mayor.

These duties to be additional to, and not to take precedence of, the duties of the Board of Health prescribed by ordinance.

REGULATIONS TO PREVENT THE SPREAD OF TUBERCULOSIS IN MUNICIPAL BUILDINGS, OFFICES AND WORKSHOPS.

1. All employees of the City of Boston are positively forbidden to spit upon the floors.
2. Rooms, hallways, corridors and lavatories shall be freely aired and effectually cleaned at least once a day and not during working hours.
3. Spittoons shall receive a daily cleansing with very hot water, and when placed ready for use must contain a small quantity of water.
4. Dust must be removed as completely as possible by means of dampened cloths or mops. It should never be needlessly stirred up by a broom or duster, as this practice only spreads the dust and germs.
5. Floors of tiling, brick or stone must be frequently scoured with soap and water.
6. The senior clerks in charge of workrooms will take measures to secure during working hours the admission of as much fresh air and sunshine as the conditions will permit.
7. The use of individual drinking glasses is recommended.
8. Persons in the employ of the City of Boston who suffer from pulmonary tuberculosis shall be separated when possible from others while at work, and they should be cautioned to use telephones only when necessary.
9. Such persons will not be permitted to use the public spittoons, but must provide themselves with individual sputum receivers, preferably of easily destructible material, and carry

these with them on arrival and departure. They will he held strictly responsible for the disposal and destruction of their own sputum, so that no other person's health may be endangered therefrom.

10. Such persons must provide their own drinking glasses, soap and towels, and shall not use those provided for the general use.

11. Plainly printed notices, reading, "Do not spit on the floor; to do so may spread disease," shall be prominently posted in rooms, hallways, corridors and lavatories of public buildings.

Respectfully,

JOHN F. FITZGERALD, *Mayor.*

In accordance with instructions contained in the above circular, the Board of Health appointed from its employees three "sanitary boards," with instructions to make a thorough sanitary inspection of the public buildings and workshops under the various city departments. On completion of the work detailed reports were made and placed on file, and the following report sent to the Mayor for his information:

HEALTH DEPARTMENT,
OLD COURT HOUSE, BOSTON, April 26, 1907.

HON. JOHN F. FITZGERALD,
Mayor of Boston:

DEAR SIR,— In compliance with your order in Circular No. 14, the Board of Health begs leave to submit its full report.

There have been 286 reports of land and buildings submitted to the Board of Health by the three Sanitary Boards, copy of which we enclose. We find there were no defects in 151 buildings and land connected therewith. Defects were found in 135 buildings. As we received from our inspectors the reports of unsanitary conditions, notice was immediately sent to the head of the department, and a large portion of the defects have already been repaired. Structural defects and recommendations made are submitted with the report of each department in the full report.

We submit the following general recommendations:

Abolition of roller towels in all departments and the substitution of single towels in place thereof.

All departments should have cuspidors, which should be properly and frequently disinfected.

All privy vaults should be abolished, as they are very offensive and are liable to breed disease.

All manure pits should be abolished; in small stables covered galvanized barrels should be used, and in large stables (having fifteen or more horses) a manure cart with a canvas cover should be provided, and manure frequently removed, in accordance with the regulations of the Board of Health. Drainage from stable should enter the sewer.

Where it is possible, all drainage and sewage now flowing into the harbor and neighboring rivers should be entered into the sewer.

More ventilation and light should be provided in many public buildings, particularly in the cells in police stations.

I have the honor to be

Very respectfully,

C. E. DAVIS, JR.,
Secretary.

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